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No. 4

THE
International Journal
of
Orthodontia,
Oral Surgery and Radiography

*A Monthly Journal Devoted to the Advancement
of the Sciences of Orthodontia, Oral Surgery,
and Dental and Oral Radiography*

NEW YORK SOCIETY OF ORTHODONTISTS NUMBER

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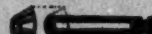
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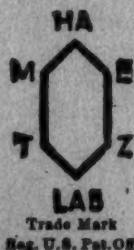
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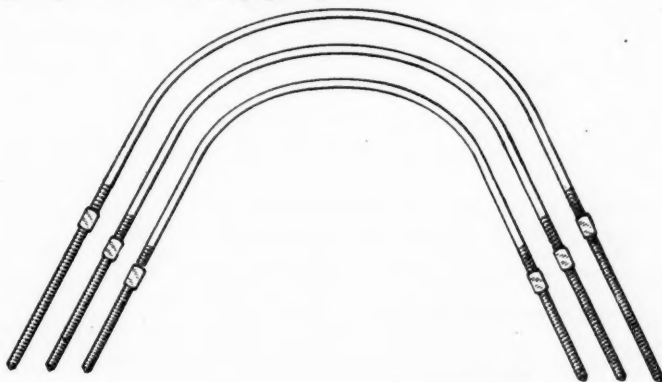


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The International Journal of Orthodontia, Oral Surgery and Radiography

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VOL. VIII

ST. LOUIS, APRIL, 1922

No. 4

ORIGINAL ARTICLES

A CONSIDERATION OF NORMAL AND ABNORMAL DENTURES AS A PROBLEM OF THREE DIMENSIONAL SPACES AND ITS BEARING ON ORTHODONTIC CLASSIFICATION AND TERMINOLOGY*

BY FREDERICK LESTER STANTON, D.D.S., NEW YORK CITY

“OF THE chemistry of his day and generation, Kant declared that it was ‘a science, but not science,’—‘eine Wissenschaft, aber nicht Wissenschaft;’ for that the criterion of physical science lay in its relation to mathematics. And a hundred years later Du Bois Reymond, profound student of the many sciences on which physiology is based, recalled and reiterated the old saying, declaring that chemistry would only reach the rank of science, in the high and strict sense, when it should be found possible to explain chemical reactions in the light of their causal relation to the velocities, tensions and conditions of equilibrium of the component molecules; that, in short, the chemistry of the future must deal with molecular mechanics, by the methods and in the strict language of mathematics, as the astronomy of Newton and Laplace dealt with the stars in their courses. We know how great a step has been made towards this distant and once hopeless goal, as Kant defined it, since van’t Hoff laid the firm foundations of a mathematical chemistry, and earned his proud epitaph, *Physicam chemiae adiunxit*.

“We need not wait for the full realization of Kant’s desire in order to apply to the natural sciences the principle which he urged. Though chemistry fall short of its ultimate goal in mathematical mechanics, nevertheless physiology is vastly strengthened and enlarged by making use of the chemistry,

*Read before the New York Society of Orthodontists, New York, Feb. 8, 1922.

(Copyright, 1922, by Dr. F. L. Stanton)

as of the physics, of the age. Little by little it draws nearer to our conception of a true science, with each branch of physical science which it brings into relation with itself; with every physical law and every mathematical theorem which it learns to take into its employ. Between the physiology of Haller, fine as it was, and that of Helmholtz, Ludwig, Claude Barnard, there was all the difference in the world.

"As soon as we adventure on the paths of the physicist, we learn to weigh and to measure, to deal with time and space and mass and their related concepts, and to find more and more our knowledge expressed and our needs satisfied through the concept of number, as in the dreams and visions of Plato and Pythagoras; for modern chemistry would have gladdened the hearts of those great philosophic dreamers.

"But the zoologist or morphologist has been slow, where the physiologist has long been eager, to invoke the aid of the physical or mathematical sciences; and the reasons for this difference lie deep, and in part are rooted in old traditions. The zoologist has scarce begun to dream of defining, in mathematical language, even the simpler organic forms. When he finds a simple geometrical construction, for instance in the honeycomb, he would fain refer it to physical instinct or design rather than to the operation of physical forces; when he sees in snail, or nautilus, or tiny foraminiferal or radiolarian shell, a close approach to the perfect sphere or spiral, he is prone, of old habit, to believe that it is after all something more than a spiral or a sphere, and that in this 'something more' there lies what neither physics nor mathematics can explain. In short he is deeply reluctant to compare the living with the dead, or to explain by geometry or by dynamics the things which have their part in the mystery of life. Moreover he is little inclined to feel the need of such explanations or of such extension of his field of thought. He is not without some justification if he feels that in admiration of nature's handiwork he has an horizon open before his eyes as wide as any man requires. He has the help of many fascinating theories within the bounds of his own science, which, though a little lacking in precision, serve the purpose of ordering his thoughts and of suggesting new objects of enquiry. His art of classification becomes a ceaseless and an endless search after the blood-relationships of things living, and the pedigrees of things dead and gone. The facts of embryology become for him, as Wolff, von Baer and Fritz Muller proclaimed, a record not only of the life-history of the individual but of the annals of its race. The facts of geographical distribution or even of the migration of birds lead on and on to speculations regarding lost continents, sunken islands, or bridges across ancient seas. Every nesting bird, every ant-hill or spider's web displays its psychologic problems of instinct or intelligence. Above all, in things both great and small, the naturalist is rightfully impressed, and finally engrossed, by the peculiar beauty which is manifested in apparent fitness or 'adaptation,'—the flower for the bee, the berry for the bird.

"But the physicist proclaims aloud that the physical phenomena which meet us by the way have their manifestations of form, not less beautiful, and scarce less varied, than those which move us to admiration among living

things. The waves of the sea, the little ripples on the shore, the sweeping curve of the sandy bay between its headlands, the outline of the hills, the shape of the clouds, all these are so many riddles of form, so many problems of morphology, and all of them the physicist can more or less easily read and adequately solve; solving them by reference to their antecedent phenomena, in the material system of mechanical forces to which they belong, and to which we interpret them as being due. They have also, doubtless their immanent teleological significance; but it is on another plane of thought from the physicist's that we contemplate their intrinsic harmony and perfection, and 'see that they are good.'

'Nor is it otherwise with the material forms of living things. Cell and tissue, shell and bone, leaf and flower, are so many portions of matter, and it is in obedience to the laws of physics that their particles have been moved, molded and conformed.

"How far, even then, mathematics will suffice to describe, and physics to explain, the fabric of the body no man can foresee. It may be that all the

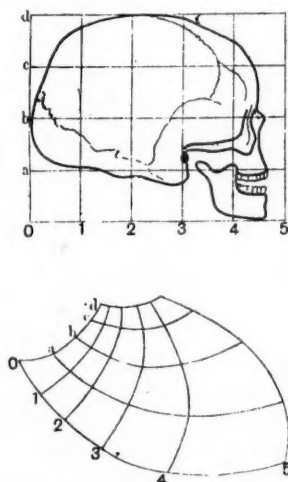


Fig. 1.—The human skull is shown by Thompson with the superimposed Cartesian coordinates. (1, 2, 3, 4, and a, b, c, d.) By plotting a series of homologous points on the skull of a chimpanzee, and drawing a smooth curve through these points we have the deformed grid related to the chimpanzee's skull.

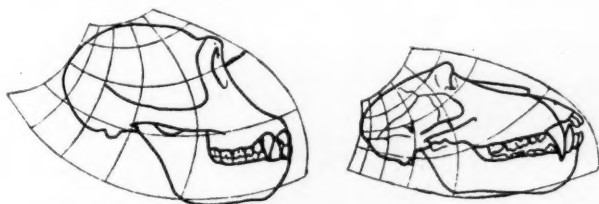


Fig. 2.—This grid is shown in Fig. 1, the curves being projections of the coordinates on the human skull. By this graphic method Thompson is able to show the prognathism and small brain of the chimpanzee as compared to man. Fig. 2 also contains skull of baboon, showing the deformed grid as related to this order and permitting a comparison with man and the chimpanzee.

laws of energy, and all the properties of matter, and all the chemistry of all the colloids are as powerless to explain the body as they are impotent to comprehend the soul. For my part, I think it is not so. Of how it is that the soul informs the body, physical science teaches me nothing; consciousness is not explained to my comprehension by all the nerve-paths and 'neurones' of the physiologist; nor do I ask of physics how goodness shines in one man's face and evil betrays itself in another. But of the construction and growth and working of the body, as of all that is of the earth earthy, physical science is, in my humble opinion, our only guide.

"Often and often it happens that our physical knowledge is inadequate to explain the mechanical working of the organism; the phenomena are superlatively complex, the procedure is involved and entangled, and the investigation has occupied but a few short lives of men. When physical science falls short of explaining the order which reigns throughout these manifold phenomena,—an order more characteristic in its totality than any of its phenomena in themselves,—men hasten to invoke a guiding principle, and entelechy; or call it what you will. But all the while, so far as I am aware, no physical law, and more than that of gravity itself, no not even among the puzzles of chem-

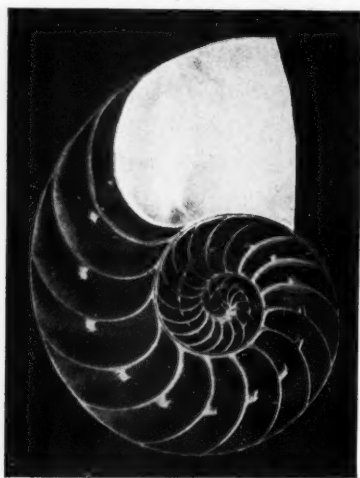


Fig. 3.—Thompson's *Growth and Form* shows the nautilus is formed on a true logarithmic spiral.



Fig. 4.—Jay Hambidge (*Dynamic Symmetry*) shows the Greeks and Egyptians were familiar with the geometrical forms of living things, especially the spiral and related figures as shown in Fig. 3.

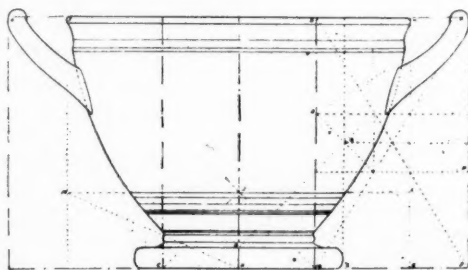


Fig. 5.—The vase shown in Fig. 4 is analyzed in Fig. 5 and shows that the craftsman who designed this vase was not only familiar with geometry but also the geometry of living things.

ical 'stereometry,' or of physiologic 'surface-action' or 'osmosis,' is known to be transgressed by the bodily mechanism.

"The terms *Form and Growth*, which make up the title of this little book, are to be understood, as I need hardly say, in their relation to the science of organisms. We want to see how, in some cases at least, the forms of living things, and of the parts of living things, can be explained by physical considerations, and to realize that, in general, no organic forms exist save such as are in conformity with ordinary physical laws. And while

growth is a somewhat vague word for a complex matter, which may depend on various things, from simple imbibition of water to the complicated results of the chemistry of nutrition, it deserves to be studied in relation to form, whether it proceed by simple increase of size without obvious alteration of form, or whether it so proceed as to bring about a gradual change of form and the slow development of a more or less complicated structure.

"In the Newtonian language of elementary physics, force is recognized by its action in producing or in changing motion, or in preventing change of motion, or in maintaining rest. When we deal with matter in the concrete, force does not, strictly speaking, enter into the question, for force, unlike matter, has no independent objective existence. It is energy in its various forms, known or unknown, that acts upon matter. But when we abstract our thoughts from the material to its form, or from the thing moved to its motions, when we deal with the subjective conceptions of form, or movement, or the movements that change of form implies, then force is the appropriate term for our conception to the causes by which these forms and changes of form are brought about. When we use the term force, we use it, as the

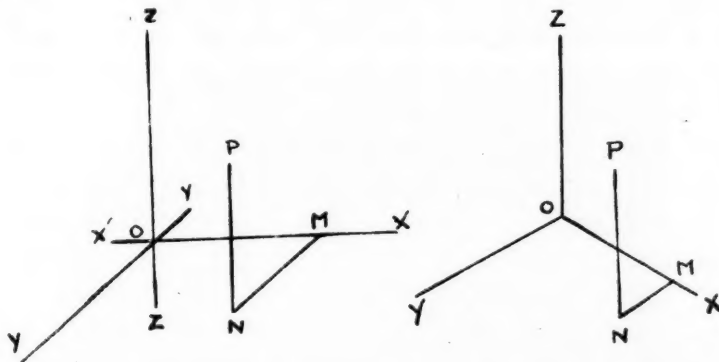


Fig. 6.—Left hand figure to illustrate the octants made by the three reference planes. Point *P* is represented in an octant. Right hand shows the octant containing *P*.

physicist always does, for the sake of brevity, using a symbol for the magnitude and direction of an action in reference to the symbol or diagram of a material thing. It is a term as subjective and symbolic as form itself, and so is appropriately to be used in connection therewith.

"The form, then, of any portion of matter, whether it be living or dead, and the changes of form that are apparent in its movements and in its growth, may in all cases alike be described as due to the action of force. In short, the form of an object is a 'diagram of forces,' in this sense, at least, that from it we can judge of or deduce the forces that are acting or have acted upon it: in this strict and particular sense, it is a diagram,—in the case of a solid, of the forces that have been impressed upon it when its conformation was produced, together with those that enable it to retain its conformation; in the case of a liquid (or of a gas) of the forces that are for the moment acting on it to restrain or balance its own inherent mobility. In an organism, great or small, it is not merely the nature of the motions of the living substance that we must interpret in terms of force (according to

kinetics), but also the conformation of the organism itself, whose permanence or equilibrium is explained by the interaction or balance of forces, as described in statics.

"Morphology then is not only a study of material things and of the forms of material things, but has its dynamical aspect, under which we deal with the interpretation, in terms of force, of the operations of energy. And here it is well worth while to remark that, in dealing with the facts of embryology or the phenomena of inheritance, the common language of the books seems to deal too much with the material elements concerned, as the causes of development, of variation or of hereditary transmission. Matter as such produces nothing, changes nothing, does nothing; and however convenient it may afterwards be to abbreviate our nomenclature and our descriptions, we must most carefully realize in the onset that spermatozoon, the nucleus, the chromosomes or the germ-plasm can never act as matter alone, but only as seats of energy and as centres of force."* (Figs. 1, 2, 3, 4, 5.)

Precise measurements of the normal human denture reveal the symmetrical arrangement of the teeth in three dimensions.

Precise measuring, connotes the intelligent use of precision instruments with results expressed in terms intelligible to any person conversant with dimensional space.

To study the form of a denture we naturally turn to that branch of mathematics which has for its province the study of the properties of space—geometry. I recall a few of the principles of projective geometry:

Space is filled with points, lines and planes† and these are the elements out of which our figures are to be formed.

A line is a straight line extending both ways to infinity.

A plane is a plane surface extending in all directions to infinity.

Three planes, which do not meet in a line, have *one single point* in common.

A point is determined by three planes which do not pass through a line.

A plane is determined:

By three points which do not lie in a line.

A line is determined by two points.

Descriptive Geometry is concerned with the methods of representing solids and other figures in three dimensions by means of drawings in one plane. Britannica, page 707, Vol. II.

Solid Analytical Geometry. Any point in space may be specified by three coordinates. We consider three fixed planes of reference. Three planes which are at right angles two and two. They divide all space into eight parts called octants. (Britannica, 717, Vol. II.) (Fig. 6.) Coordinate is defined as a member

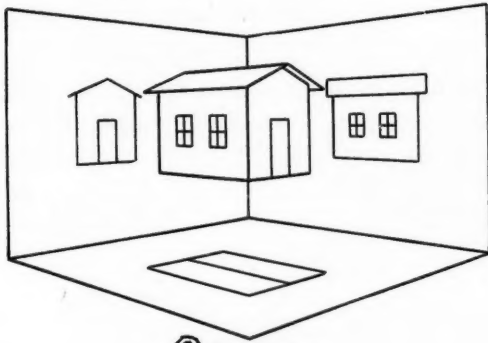
*In the discussion that followed the reading of this paper it was felt that I had advocated the conclusions of Thompson and Hambidge. It would be presumption on my part to assume that I am competent to be a judge of their splendid work.

†The object of incorporating the extensive quotation from *Growth and Form* and the illustration from *Dynamic Symmetry* was to show that men of science believed in the *mathematical approach* of any problem dealing with form and motion even though the form and motion pertain to *living things*.—F. L. S.

‡It is understood that there are other surfaces than planes. Planes being but one of the divisions of the surfaces that are found in space.

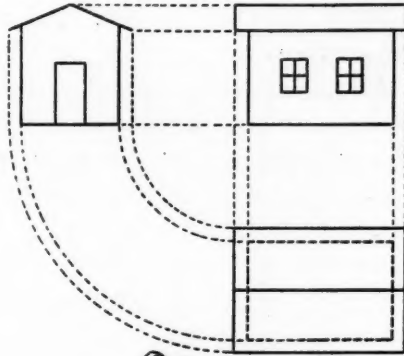
of a system of lines or angles by means of which, as elements of reference, position is determined in relation to certain fixed lines or planes.

Vector, a line conceived to have both a fixed length and a fixed direction in space but no fixed position: That quantity which determines the position of one point in space relative to another, conceived as the line from one to the other.



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A.



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B.

Figs. 7 A and B.—Illustrative of the principle of orthographic projection. All parts of the object are transferred to planes of projection by slight lines at right angles to those planes. This kind of projection reproduces to full scale all dimensions parallel to the projection plane.

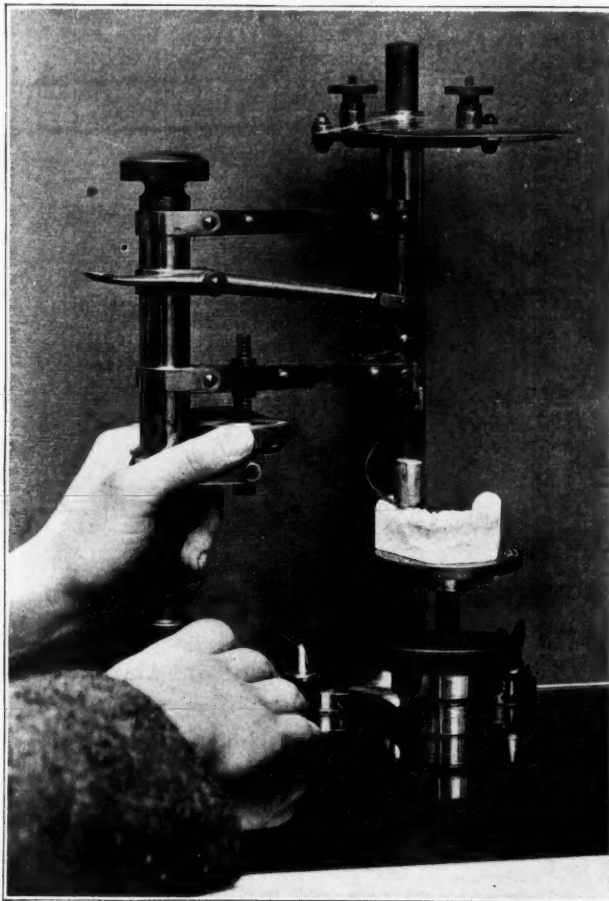


Fig. 8.—Surveying apparatus.

For convenience in measuring the denture we will resort to projection. When points in space are projected in straight parallel lines to a plane it is called orthographic projection. (Fig. 7.)

By means of a suitable surveying instrument (Fig. 8) dentures may be orthographically projected in three dimensions.

With these definitions in mind we will proceed to define the *occlusal plane* and *three reference planes*. All normal deciduous dentures close nearly on a plane surface.

All normal permanent dentures, in front of the molar series, are nearly flat. With respect to some plane surface which will conventionally be regarded as horizontal, every maxillary tooth (not a molar) shall extend as far below this

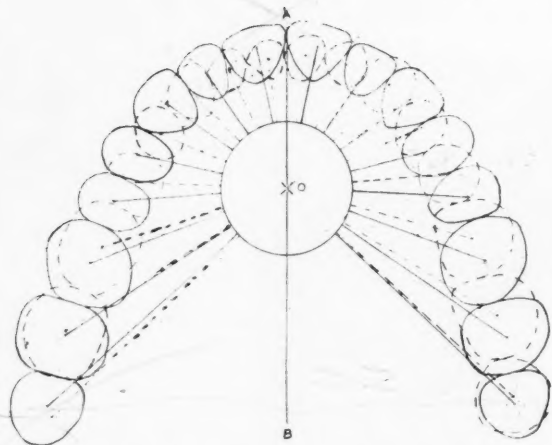


Fig. 9.—Solid lines upper gingival margins. Dotted lines lower gingival margin. Vectors of upper teeth solid lines from centroid of teeth to centroid of denture at O. Vectors of lower teeth dotted line.

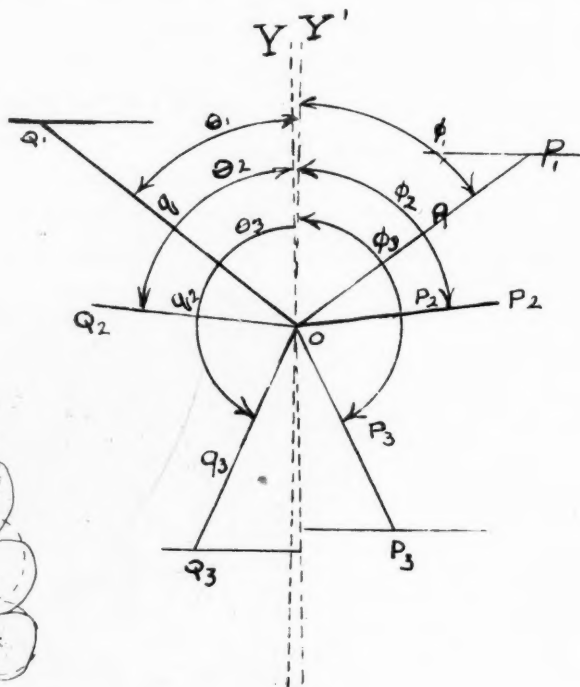


Fig. 10.

plane as the corresponding mandibular tooth extends above it. This plane will be referred to as the *occlusal plane*.

The *centroid* of a tooth may be conventionally defined as the geometrical centroid of the closed line known as the "gingival margin."* The point thus defined is generally neither the geometrical centroid of the tooth nor the physical center of mass. Its only significance is that it is a centrally situated point in the tooth conveniently determinate and marking fairly well the location of the tooth as a whole. (Fig. 9.)

The *centroid of a denture* may be defined as the geometrical centroid of

*If a tooth in normal occlusion were translated on its vertical axis and should perforate a medium which would register the greatest circumference of the crown the resulting opening would be the "gingival margin."

the centroids of all the teeth comprising the denture. In the case of a denture conforming to the criteria for normal configuration, the plane surface containing the centroid of the denture and lying parallel to the occlusal plane, will be called the *plane of horizontal projection* or the *XY-plane*. Generally the XY-plane will lie near the occlusal plane: these two planes will coincide if the centroid of the denture happens to lie in the occlusal plane. These

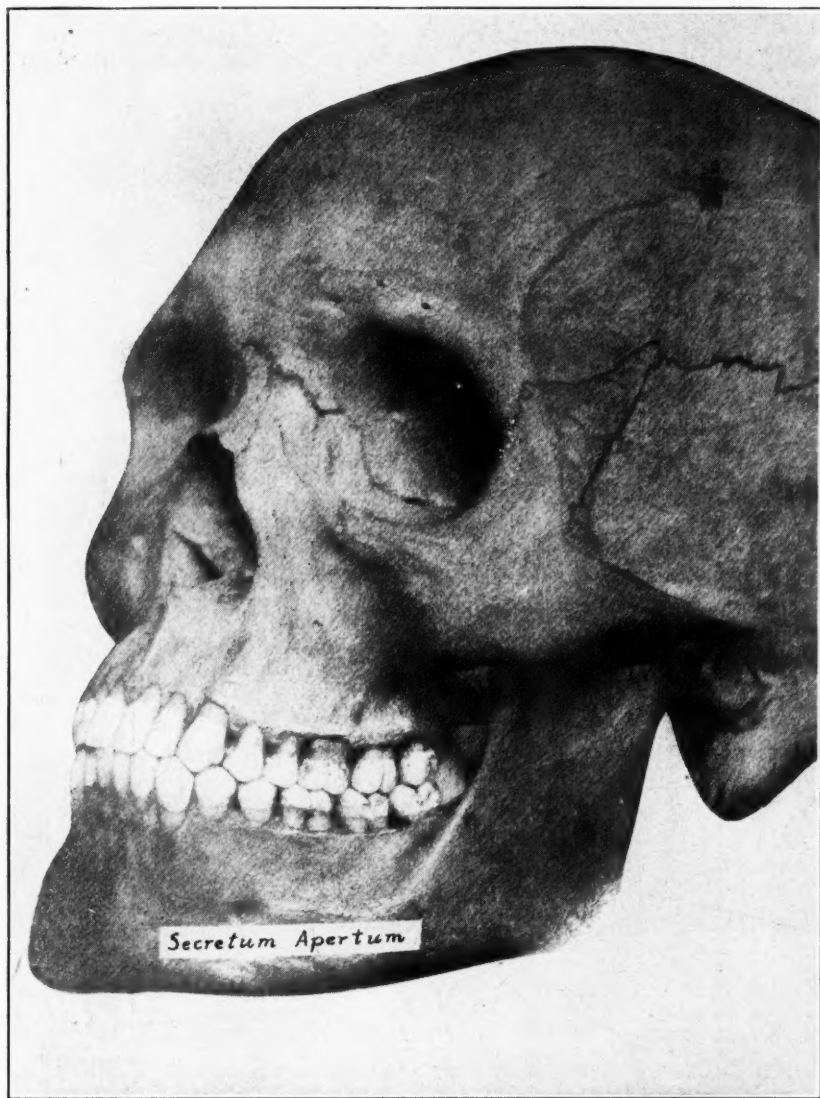


Fig. 11.—Normal occlusion of teeth. Secretum apertum. (Summa.)

planes will conventionally be regarded as horizontal; accordingly, all planes at right angles to them will be vertical.

Centroid of denture at *O* (Fig. 9) is found by measuring from two bases. the average distance of the tooth centroids from each of these bases where the lines cross at *O* is the centroid of the denture.

Having obtained the centroid of the denture we now proceed to find the

axis of symmetry for our group of tooth centroids. (*A-B*, Fig. 9, is axis of symmetry.) (Fig. 10.)

Given a number of pairs of corresponding points, P_1-Q_1 , P_2-Q_2 , etc., which are nearly symmetrically disposed on opposite sides of an axis, to find the axis *OY* of least asymmetry, viz., that axis such, that if the plane containing

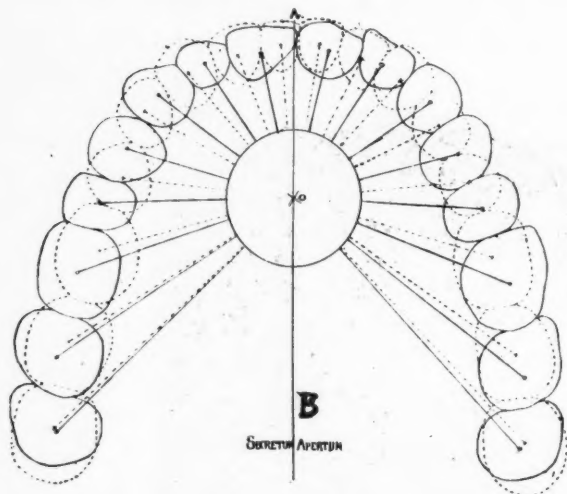


Fig. 12.—Secretum apertum. Uppers solid line, lowers broken line, centroids of teeth, centroids of denture at *O*, axis of symmetry, *A-B*.

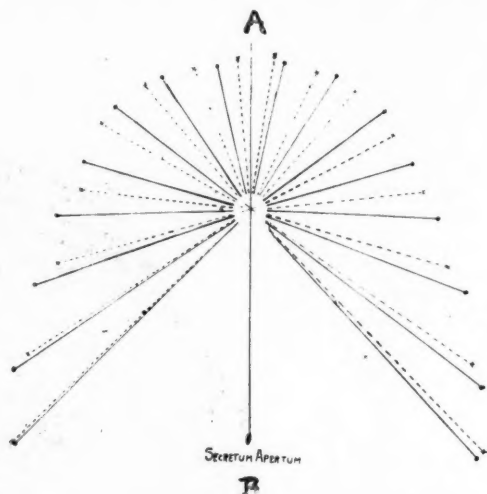


Fig. 13.—Secretum apertum. Tooth centroids, centroid of denture at *O*, vectors upper solid line, vectors lower broken line, axis of symmetry, *A-B*.

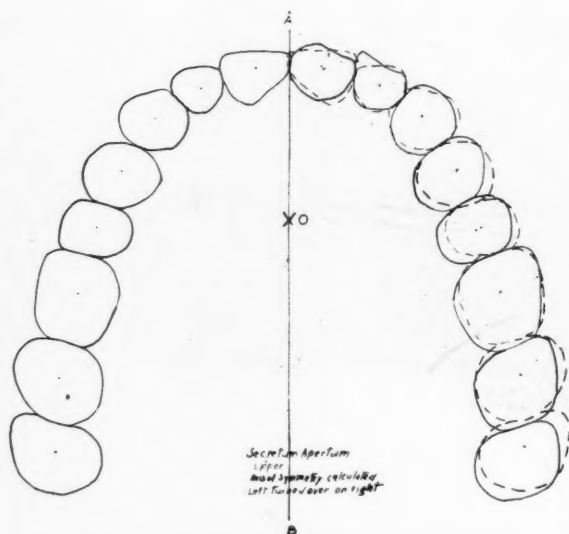


Fig. 14.—Secretum apertum map of upper teeth (plus centroids) in solid lines. Map folded on axis of symmetry *A-B* and the left side traced over right in broken line.

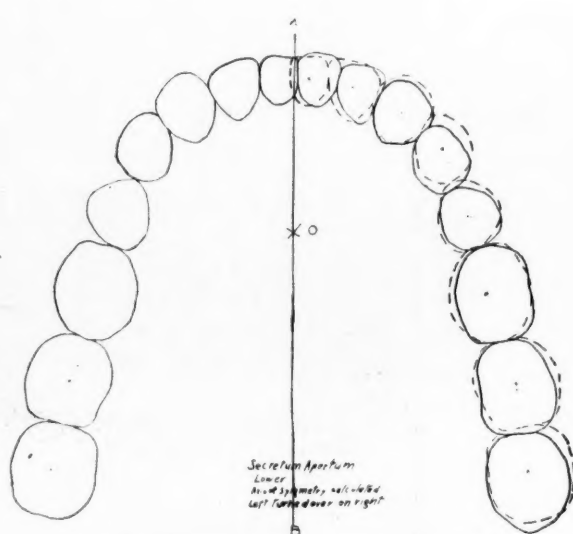


Fig. 15.—Secretum apertum, lower teeth (plus centroids) in solid lines. Map folded on axis of symmetry *A-B* and the left side traced over right in broken line.

points and axis be folded on that axis, then the *P* points shall as nearly as possible fall upon the corresponding *Q* points; in mathematical terms, the sum of the squares of the resulting small distances P_1Q_1 , P_2Q_2 , etc., shall be the least possible.

It can be proved, that the axis must pass through the centroid of the

system. Let O be the centroid of all the P points and Q points. Through O draw a line OY' bisecting the angle $Q_1 OP_1$. Measure the angles ϕ , ϕ , etc., between the OY' and the vectors OP_1 , OP_2 , etc., and also the angles θ_1 , θ_2 , etc., between OY' and the vectors OQ_1 , OQ_2 etc. Measure also the lengths p_1 , p_2 , etc., of the P vectors, and the lengths of the Q vectors.

Form a table as illustrated below, and enter in it the measured values of θ , ϕ , q , p . Find the difference $\theta - \phi$, the products qp , and the products $qp (\theta - \phi)$. Take the sums in the columns of qp and $qp (\theta - \phi)$, and finally take half the quotient of the latter sum by the former sum. The result, expressed in angular measure, is the value of the angle by which the line OY' diverges from the axis of lease asymmetry, OY . In case the angle be positive, lay it off from OY' toward OQ_1 ; if negative, lay off toward OP_1 .

The method given for computing the angle to be used in locating the axis is not rigorously correct, but is closely approximate when the symmetry is good.

$\Delta = +6420$ $\frac{\quad}{2 \times 2934} = +1.1^\circ$	Q	P	QP	θ	ϕ	$\theta - \phi$	$QP(\theta - \phi)$	angle $\delta = \frac{E[qp(\theta - \phi)]}{2 E [qp]}$
	41.2	36.9	1520	52.7°	52.7°	0.0	0	
	23.1	24.3	556	84.5°	81.6°	+2.9°	+1610	
	30.0	28.6	858	156.8°	151.2°	+5.6°	+4810	
			2934				+6420	

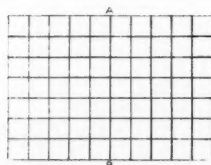


Fig. 16.—Grid for testing symmetry.

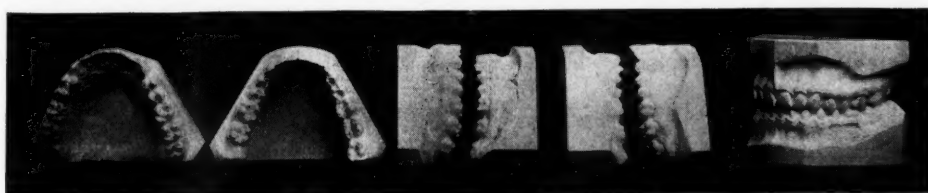


Fig. 17.—Wilk's Case.

Let there be passed through the centroid of the denture and axis of symmetry the plane of maximum symmetry, this plane will be called the YZ plane (sagittal plane). A vertical plane containing the centroid of the denture and intersecting the XY plane and YZ plane at right angles will be called the XZ plane.

Three reference planes for a denture in normal occlusion have been defined above. They are XY , YZ , and XZ , and they all intersect at the centroid of the denture, which will be taken as the origin of coordinates and designated O . Any orthographic map of the denture will be made by projecting at right angles to one of the three reference planes. If the projecting is done at right angles to the horizontal plane XY , the map will be a horizontal projection;

if at right angles to YZ a side elevation; if at right angles to XZ , a front or rear elevation.

The location of any tooth with respect to the reference planes may be given by the coordinates $X Y Z$ denoting the distances of the tooth centroid from the three planes, any single point may be defined in like manner.

In surveying a denture it is important to get the correct level of models in order to establish the plane of projection (XY plane). Let the model of the denture in malocclusion be mounted on a surveying instrument and leveled according to the judgment of the operator, the aim in levelling being to estimate the direction of the XY plane in relation to the model and make this plane parallel to the horizontal motions of the instruments.

Let the model thus mounted be surveyed in three dimensions. The horizontal projection or plane, will not be appreciably affected by faulty levelling unless the vertical malocclusion is extreme and the levelling greatly in error. (In order to avoid waste of time a side elevation can be made in "open or close bite" cases) and this can be tried over a standard side elevation

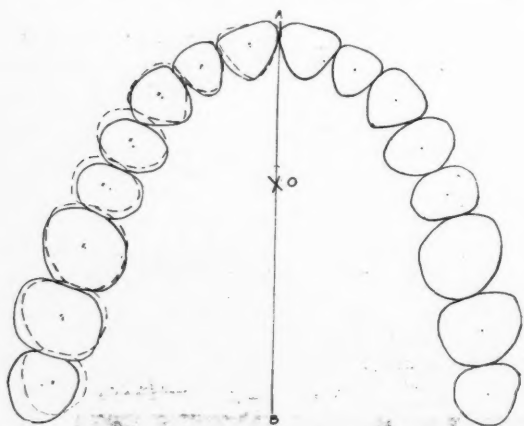


Fig. 18.—Wilk's Case.

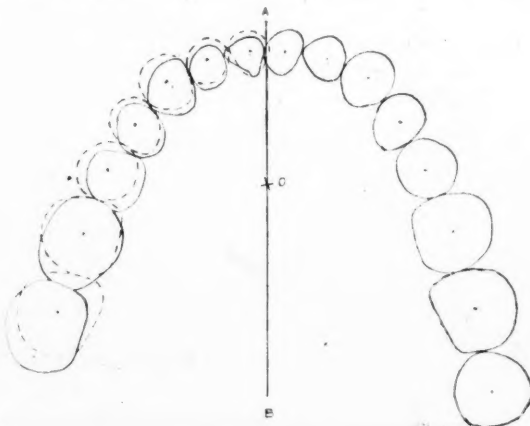


Fig. 19.—Wilk's Case.

taken from a case of normal occlusion any error (in levelling and establishing the XY plane) can readily be detected and the correct level found. A more definite and precise method of levelling will be published shortly in a paper describing arch determination and map placements to produce a minimum of tooth movement.

Secretum apertum, probably the most famous skull in orthodontia will now be analyzed by means of orthographic projections, its symmetry tested by calculating the centroid of the denture and its axis of symmetry. (Fig. 1.) Secretum apertum* (Angle, malocclusion of the teeth, page 15, Fig. 5.)

By means of a transparent sheet ruled in 5 centimeter squares the symmetry of any occlusion or malocclusion may be tested by placing center line A. B. over the axis of symmetry.†

*The surveys of Secretum apertum were made by Dr. Juan Manes Retana, of Madrid, from models (of the skull) made by Dr. J. Lowe Young, who kindly loaned them to the writer.

†The symmetroscope of Gruenberg should be studied by the reader, also its modification by Sheldon Fried, both reported in *Dental Cosmos* of 1912 and 1914. Also the studies of Van Loon, *Dental Cosmos* of 1915 showing the craniophor. Dr. Morse also has used transparent celluloid ruled in squares. Morse measured the asymmetry by placing the celluloid sheet over the mandibular and the maxillary models. Morse axis was established by eye.

The following figures marked Wilks case were made from models of a patient who had nearly normal occlusion. No legends will be required as it has been treated in the same way as secretum apertum; the legends of which are to be applied to these figures (17 to 20, also Fig. 9).

The two cases show a remarkable degree of symmetry, and present normal occlusion in a new light—a symmetrical arrangement of the tooth centroids about a common centroid *O*. *Homologous tooth centroids having vectors of nearly equal length and angle.*

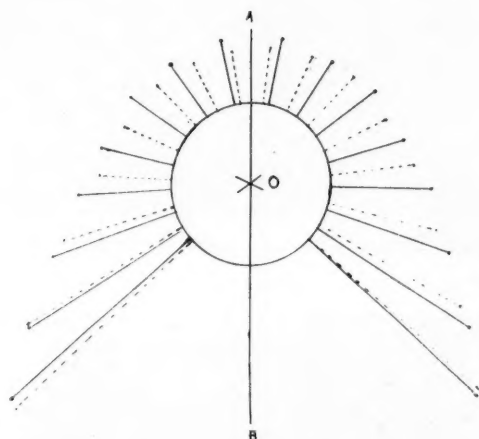


Fig. 20.—Wilks' Case.

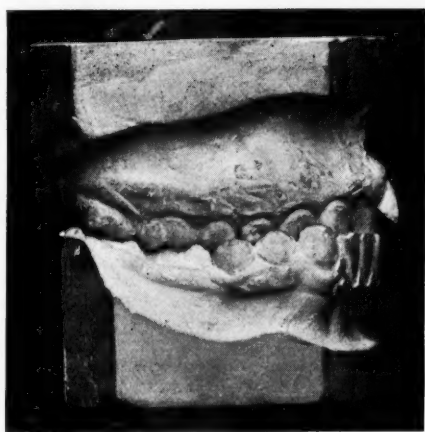


Fig. 21.—Dewey case.



Fig. 22.—Dewey case.

We now propose to test the symmetry of some cases of malocclusion.

Dr. Martin Dewey, after examining our method of determining the axis of symmetry, proposed a test of the method and selected for his test one of the cases in his clinic. (Figs. 21, 22, 23, and 24.)

By placing the cross section paper over this map all asymmetries can be measured. *The line A.B. is the sense line of the denture* and should be of great help to orthodontists. (Figs. 25, 26, and 27.)

The next model to be tested is case No. 1436 of which Figs. 28, 29, 30 and 31 show four views of this case. On the right side the mandibular teeth

are completely inside the maxillary arch while on the left side shows a near approach to the norm.

Figs. 32 and 33 show the maps of the maxillary arch.

The last case I will show is one sent by Dr. Angle for diagnosis. Four

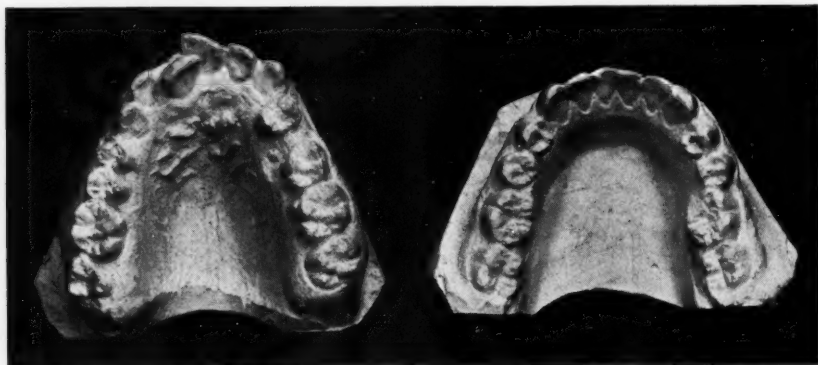


Fig. 23.—Dewey Case.

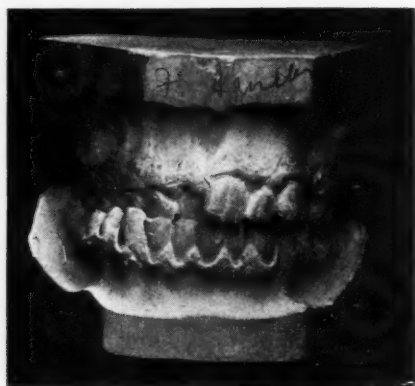


Fig. 24.—Dewey case.

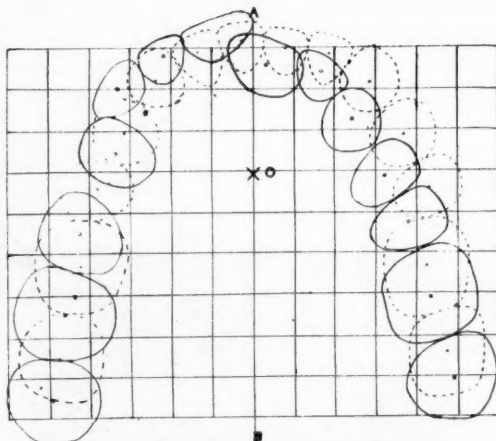


Fig. 25.—Orthographic map of Dewey model shown in (Figs. 21, 22, 23, and 24.) Upper teeth solid lines; lower teeth broken lines, *A-B* axis of symmetry, *O* centroid of denture, squares 5 mm. to test the symmetry, centroids of the teeth marked with dots.

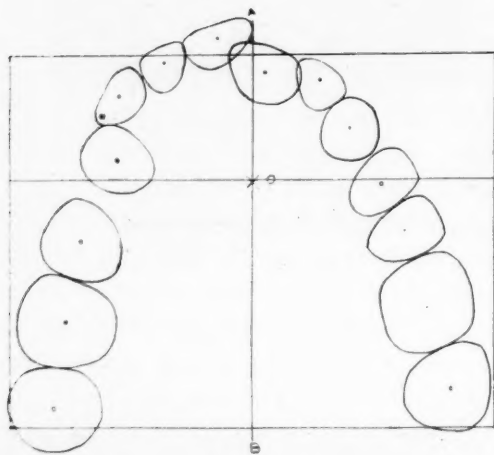


Fig. 26.—Upper jaw, Dewey model.

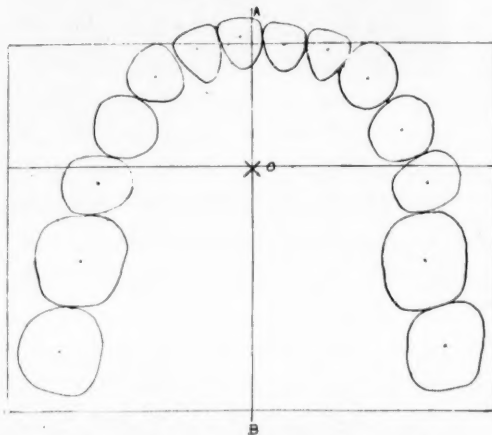


Fig. 27.—Lower jaw, Dewey model.

views of this model follow. (Note the lower right canine is impacted and its space is occupied by a supernumerary.)

Figs. 34 and 35 show the right and left side of the case.

Figs. 36 and 37 show the front and occlusal views. Figs. 38, 39 and 40 show maps of the above case.

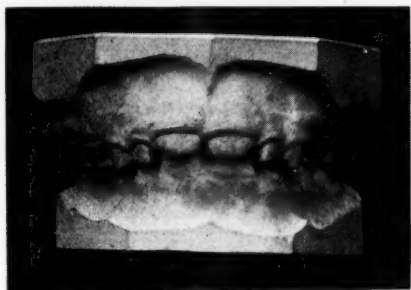


Fig. 28.—Case 1436

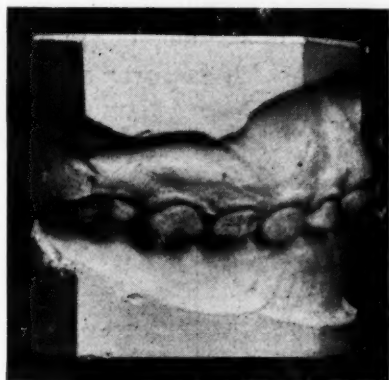


Fig. 29.—Case 1436.

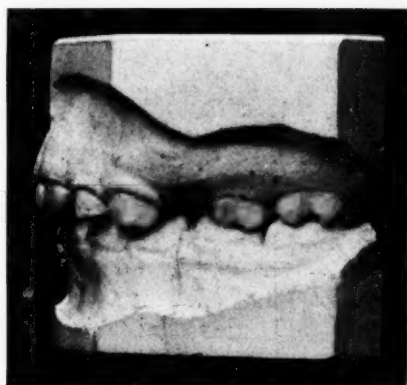


Fig. 30.—Case 1436.



Fig. 31.—Case 1436.

The model shown in Figs. 34 to 36 was submitted for classification to fourteen orthodontists with the following results: Eight classified the case as Class II, Division 2, subdivision (distoclusion), one as being Class II, Division 1, subdivision (distoclusion), and five placed it in Class I (neutroclusion).

The Angle classification is based "on the mesio-distal relations of the

teeth—dental arches and jaws which depend primarily upon the positions, mesio-distally, assumed by the first molars on their erupting and locking. Hence in diagnosing cases of malocclusion we must consider, first the mesio-distal relations of the jaws and dental arches as indicated by the relation of the lower first molars with the upper first molars—the keys to occlusion and second the positions of the individual teeth carefully noting their relations to the line of occlusion.” Angle defines the line of occlusion, “as being the line with which in form and position according to type, the teeth must be

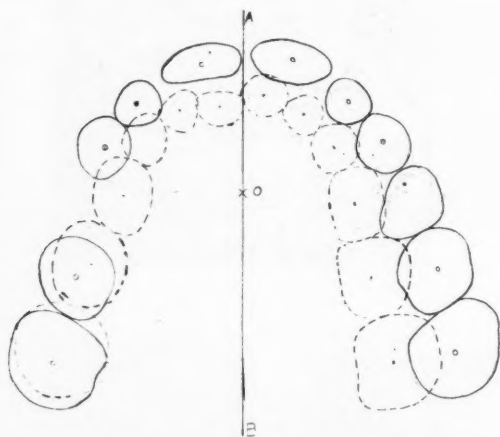


Fig. 32.—Orthographic map of Case No. 1436. Uppers solid lines, lowers broken lines, centroids of teeth are dots, *A-B* axis of symmetry, *O* centroid of denture. Note relation of lower arch on right side.

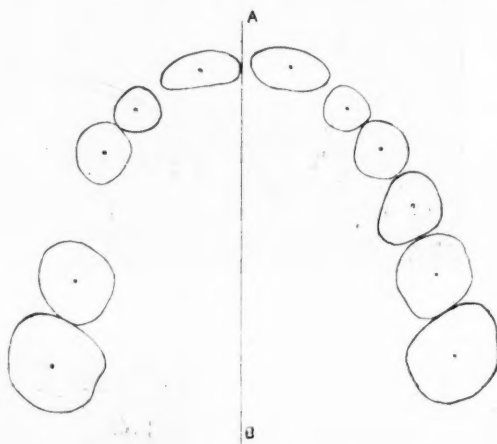


Fig. 33.—Upper map of Case 1436. Axis of symmetry *A-B*.

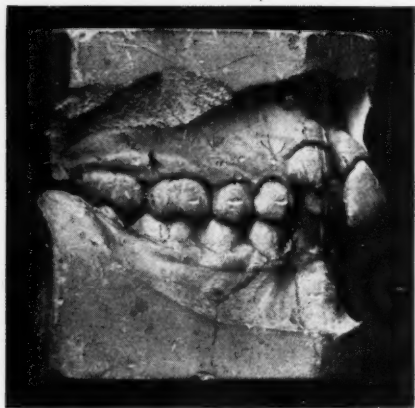


Fig. 34.—Angle Case.

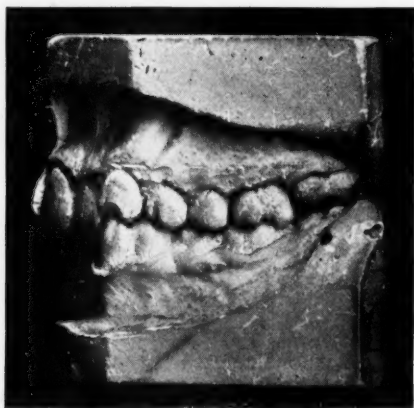


Fig. 35.—Angle Case.

in harmony if in normal occlusion.” He further states that “There can be but one true line of occlusion of each individual and the line of occlusion should be in harmony in form and position with and in proper relation to all other parts of the great structure” i.e., the body.

“We speak of moving a tooth of the lower arch into the line of occlusion or of moving the tooth of the upper arch into the line of occlusion, but it must always be remembered that there can be one *true line of occlusion*.” Angle. “This line describes more or less of a parabolic curve and varies with

the limits of the normal according to race, type and temperament. It is difficult to determine exactly what the form of this line should be in each given case."

Angle proceeds to define the positions of teeth in malocclusion in relation to the line of occlusion. "That we should have a line from which to note variations from the normal in the positions of teeth is important," he then proceeds to say there are seven positions of malocclusion:

1. Outside the line, buccal or labial.
2. Inside the line, lingual.
3. Further forward, mesial.
4. Opposite, distal.

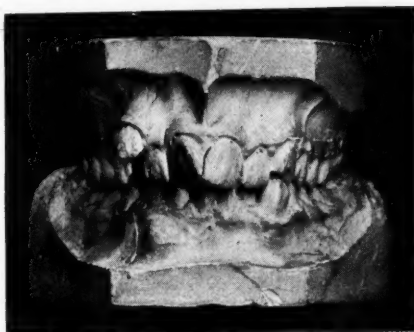


Fig. 36.—Angle Case.

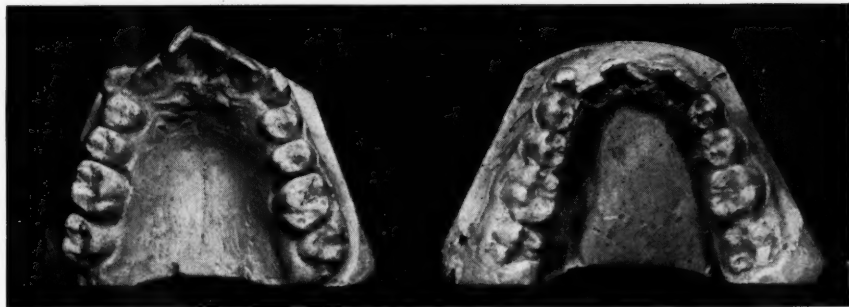


Fig. 37.—Angle Case.

5. Not sufficiently elevated in socket, infra.
6. Too great elevation, supra.
7. If turned on its axis (which axis not stated), torso occlusion.

Angle further states that "the upper first molar furnishes more nearly than other tooth or point in the anatomy an exact scientific basis from which to reason on malocclusion." This attempt to define the malpositions of teeth in reference to a line has led to some curious results. Such a keen observer as Angle states that the malposition of teeth consists principally in the variation of their crowns from the normal with usually little displacement of the apices of the roots. Orthographic projections of malocclusion show many teeth that are much out of position yet requiring translation—the root end moving an equal distance with the crown. Angle in describing an open bite, Class 1

case, with the molars and premolars in good (page 43) occlusion says, "Fig. 24 shows a case where there is infraocclusion of both maxillary and mandibular incisors with probably *slight supraocclusion of the molars*." If the line of occlusion has a fixed position in the skull as Angle stated, and supraocclusion means erupting beyond the line of occlusion how can a maxillary and mandibular molar grow past a fixed line at the same time and yet occlude?

In Class II, Division 1, Angle states that the mandibular teeth are distal with *lengthened* and protruded maxillary incisors—orthographic projections find

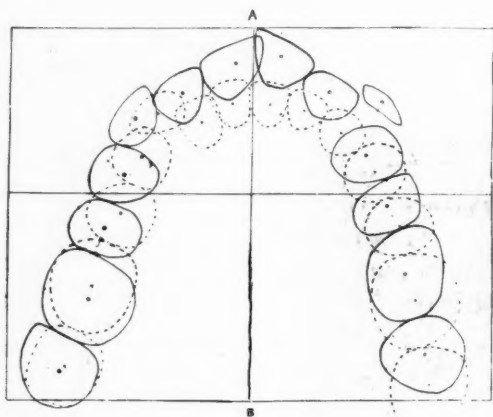


Fig. 38.—Orthographic map of Angle model shown in Figs. 34, 35, 36, and 37. Uppers solid line, lowers broken line. *A-B* axis of symmetry.

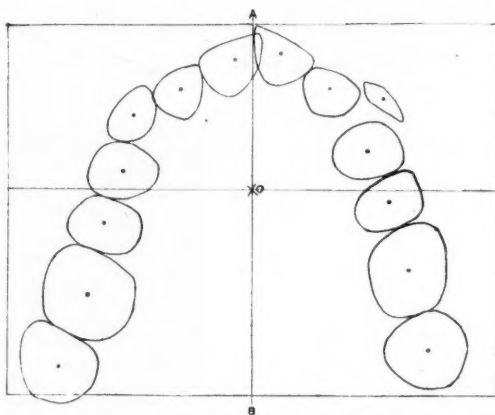


Fig. 39.—Upper map of Angle model. *A-B* axis of symmetry and trace of *YZ* plane. Also note trace of the *XZ* plane through the centroid of denture at *O*. Note lack of symmetry at end of arch.

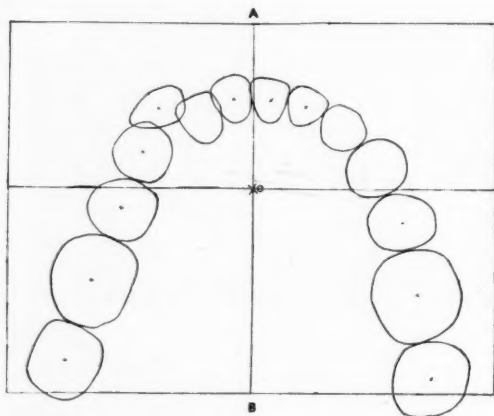


Fig. 40.—Angle model (lower). Axis of symmetry, *A-B*, centroid at *O*, trace of *XZ* plane through centroid *O*.

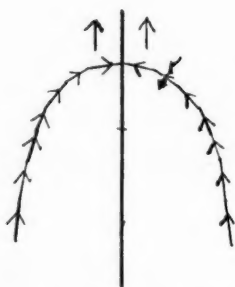


Fig. 41.—Arrows indicate mesial movements as applied to individual teeth and to the lower jaw.

these teeth shortened. Many other flagrant contradictions could be pointed out but it seems unnecessary. "Any plan which is fundamentally based on an error of principle is doomed to failure."

The writer proposes the abolishment of Angle, Case and Lischer Classifications, together with most of the present terminology of orthodontics. If you turn from one text to another you will find error piled on error. Case 1921 Edition of Dental Orthopedia in defining the occlusal plane says: "The front part of the lower plane curves upward." "Posteriorly the plane curves

slightly downward and then as it passes the first molars it again curves slightly upward." Planes curving! Oh, shades of Euclid!

- A body in space can only be: 1. Rotated on an axis. 2. Bodily displaced. 3. Bodily displaced and rotated.

In translation all points in a body move in similar directions equally.

In rotation a body turns on an axis.

Why should we add such a suffix as "version" when we wish to express the position of a tooth in malocclusion?

An incisor bodily displaced toward the lip is said to be in labio-version. Now "version" implies a turning. "Thus if the vector function is the velocity of a fluid at the different points of space its curl or *version* is the rotation of that fluid." The suffix version seems a misnomer as it implies that all teeth in malocclusion are rotated upon some axis, *said axis not stated*.

Consider the term mesial, a mesial direction is defined as toward the median line along the curve of the arch.

In Fig. 41 the arrows on the teeth show the various directions of mesial when applied to the different teeth. When the jaw is moved mesially the teeth move with it; the arrows show the direction of movement when the jaw moves mesially. We now find the incisors moving at right angles to the movement we previously designated as mesial. If mesial means toward the median line of the skull, how can a mandible be moved toward the median line when it is on the median line?

Dr. Dewey has pointed out editorially the futility of using mesial and distal.

Dr. Hopewell Smith of Pennsylvania has criticized the orthodontic use of mesial and distal saying we have reversed the anatomical meaning of these words.

It seems futile to further point out the fallacies of our classifications and terminology. They have well served their purpose. I believe the Angle classification will always stand as a great achievement without which orthodontic progress would have been much delayed. Any work I have done has been inspired by my contact with Angle.

"When we sincerely find we cannot agree with the past we must break with it no matter how great the prestige of its messengers."

So it seems better to adopt a simple precise terminology.

The writer suggests the following: forward or backward, right or left, up or down, rotation.

Forward to mean toward the front of the head in lines parallel to axis of symmetry.

Backward: opposite to forward.

Right or left: direction at right angles to axis of symmetry.

Up and down: parallel motion (up and down) to the vertical plane through axis of symmetry.

Rotation, turning on an axis. Axis to be stated.

Classification is not needed in such a system. The Angle model presented

today should be sufficient argument against a classification upon which experts cannot agree, especially as treatment of living tissue is based on classification.

The method offered is governed by rigid mathematical formulae easily understood and applied, and has the further advantage of being the language commonly employed for similar purposes in all other fields of applied mathematics.

The adoption, more generally, of the mathematical approach for the study of malocclusion may reveal the true deforming forces at work on the human denture leading to the adoption of preventive measures that may supercede our costly and lengthy treatments with mechanical devices.

The author wishes to acknowledge the help of his co-workers: Rudolf Hanau, Dipl. Ing., who designed the surveying apparatus; Gilbert Dudley Fish, C.E., who invented the oclusograph and the formulae for the axis of symmetry and map placement; Harry A. Goalwin, M.D., M.E., Louis A. Ungar, D.D.S., who prepared the slides; Juan Manes, M.D., D.D.S., of Madrid, who did some of the surveys, and Mitsuru Okada, D.D.S., of Tokyo, who photographed skulls at the National Museum.

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THE INFLUENCE OF CERTAIN ENDOCRINE GLANDS UPON GROWTH AND DEVELOPMENT*

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BEFORE considering the specific structure and functions of the endocrine glands, with particular reference to growth and development, it might be well to consider just what is meant by an endocrine or ductless gland. It has long been known, in fact it was demonstrated as early as 1849 by Berthold in his transplantation experiments of the cock's testis, that this gland had an influence by virtue of its growth in the new individual. Although at that time the exact nature was not understood, we now speak of the secretion from such glands as an internal secretion meaning thereby that the specific substance elaborated by the gland is absorbed directly into the blood and lymph and thus gains access to all parts of the body, the final clinical effect being produced by changes in various parts of the body. This idea of an internal secretion was given a further impulse by Bernard's classical investigations on hepatic function showing an internal secretion which is called glycogen in addition to the well-known external secretion, the bile, which is passed through the bile ducts into the intestine.

Certain of the glands in the body have only an internal secretion such as the pituitary gland, the thyroid, possibly the thymus and the adrenal glands. Some have both an external and an internal secretion such as the pancreas, which elaborates the digestive enzymes which are carried in the pancreatic juice to the intestine and an internal secretion elaborated by the well-known structures, called the islets of Langerhans, which structures have no connection with the excretory ducts of the pancreas, but pass their secretion of hormone which has an important carbohydrate regulatory function, directly into the blood stream. It is probable that the ovary and testis should be placed in this same group since we may regard the ovum and spermatozoon as representing the external secretion, whereas, we all know the importance of the internal secretion of both these glands in producing the important changes seen in both males and females, particularly at the time of puberty.

On the other hand there are certain glands, which as far as we know, have only an external secretion. However there are those who feel that even these glands have important internal secretory function. To this group belong the lacrimal and the salivary glands. An endocrine gland then, as the derivation of the name implies, is one which elaborates a secretion which is usually of a complex chemical nature, which is poured directly into the blood stream and which produces its effect by chemical changes within the blood and tissues of the body.

*Read before the New York Society of Orthodontists, New York City, Feb. 8, 1922.

Another conception which has been gaining more and more support physiologically and pathologically is this, that these endocrine glands have an important function not only with reference to the organism generally, but that they have also an important relationship to one another. Consequently one can see the enormous possibilities in pathologic physiology if we realize the direct changes which can follow disease of a ductless gland in addition to the indirect changes dependent upon associated disturbances in the other ductless glands. Thus we know from experimental and clinical investigations that disturbances in the pituitary gland are associated with disturbances in the sex sphere. For example, atrophic changes in the ovary and testis, followed by amenorrhea, sterility and loss of libido, are known to follow disturbances in the function of the pituitary. Experimentally, on the other hand, it was shown long ago by Rogowitsch that extirpation of the gland caused what was thought to be a compensatory enlargement with an increase of colloid in the pituitary.

It may be of interest to discuss briefly the manner in which our knowledge of the ductless glands has increased so remarkably and gives such wonderful promise for the future. The older anatomists occupied themselves with observations upon the structure of the ductless glands. The means for investigation available at that time were so limited that the work was carried on under great difficulties. Gradually, however, with the introduction of the microscope it was possible to delve down into the cellular structure of the ductless glands, thus placing our understanding of the normal microscopic anatomy upon a firm basis. Noting then, the intimate structure, certain deductions could be made as to function, for, as we all know, function is to such a large extent dependent upon structure. Furthermore, minute pathologic changes associated with general disturbances in the body were more readily recognized, these changes being seen in the microscope long before gross changes were visible to the naked eye. A further help in this direction contributing largely to the advancement of our knowledge concerning the ductless glands, was possible through the use of the various dyes whose properties are now understood and whose manufacture is now possible as a result of the investigations of Ehrlich. Through differences in staining affinity different types of cells were recognized and not only was it possible to differentiate different types but it was even possible to reveal the presence of secretory granules in the cytoplasm of the gland cells. By following the progress of these granules in several instances the mode of secretion of the gland was determined, that is, whether the secretion was poured into the excretory ducts or into the blood and lymph directly. Following closely upon the contributions which the anatomists made to the gross and microscopic structure of the ductless glands, came the very important and in fact the revolutionizing discoveries which the physiologists made. The gland under investigation was ground up very minutely and aqueous, saline, alcohol, ether, or in fact any kind of fluid extracts were made and these in turn injected either subcutaneously or intravenously into animals and the effects determined. Thus, for example, the rise of blood pressure, the vascular constriction and the augmentation in the force of the heart beat produced by extracts of the pituitary

gland, were reported by Oliver and Schäfer in 1895. Following in line with this came the observations of Dale and Bell who demonstrated the effect upon contractions of the uterus, the bladder and the intestines, produced by pituitary extract. This discovery has been of inestimable value, for you all know the extensive use of pituitrin in labor and in postoperative distention. Again injections of pituitary extract lower the assimilation rate for carbohydrates and cause glycogenolysis, as shown by me in 1922.

In a similar way the properties of adrenalin, the active principle obtained from the suprarenal gland, were discovered. Again the effects were further investigated by the feeding of either the fresh gland or dried extracts over long periods of time. These have not contributed so much. However, I was able to show that the feeding of pituitary extract to young rats produced early sexual ripening and a demonstrable stimulating effect upon the ovary and the testis. Use has been made of this fact in the giving of pituitary extract to cases of amenorrhea and sterility in the female and loss of power in the male, as a result of pituitary gland tumors. Considerable success has been attained by this method. The experimental surgeon has contributed his method and results, namely, in the study of transplantation of the ductless glands in whole or in part. Thus the principle formulated by Professor Halsted and based upon his parathyroid studies, namely, that an existing physiologic deficit is one of the essentials for a successful organotransplantation, was evolved. On the whole the results of transplantation of tissues has been disappointing, largely because of the fact that early destruction and absorption of the graft occurs unless the tissue comes from the same individual. Thus, the specificity of each organism for its own tissues, is a striking finding.

Then came the methods of partial or complete extirpation of one of the glands, followed by a study of the after-effects. It was thus that the important functions of the thyroid were recognized, particularly those of deficiency, for it was found that after a complete thyroid extirpation, there resulted a condition known as myxedema characterized by a sluggish mentality, underdevelopment, if the extirpation was done in youth, increase in weight, a subnormal temperature and pulse and an edematous infiltration of the skin and subcutaneous tissues with marked loss of hair. Similarly with extirpation of the pituitary in young animals, there followed failure of sex development, under stature, cessation of bony development generally and more particularly of the growth of the skull and the eruption of the teeth. In addition to the effects produced by primary changes due to the extirpation of a single gland, there were also the associated changes produced by alterations in other of the ductless glands, though of less extent.

Nature herself contributed in exhibiting the effects produced by disease of certain of the glands. Thus she herself has performed the experiment and has awaited the investigations of the clinician for the discovery of the effects and subsequent cure. A classical example of this is the immortal discovery of Addison, which attributed a definite clinical syndrome known now as Addison's disease, to the destructive process of disease of the suprarenal capsules. This contribution appeared as early as 1855. To be sure, previous to this Graves

and Basedow described a malady which we now ascribe to functional disturbance of the thyroid, producing the well-known symptom-complex of exophthalmic goiter. Finally, the most important of all for the present and for the future, are the contributions which come from the pharmacologists and the biologic chemist. For, after all, before therapy in endocrine disturbances can be satisfactorily standardized and placed upon a firm basis, we must know the chemical nature of the specific secretions of the ductless glands and must then be able to produce them synthetically in order to gain the best results and in order to be able to produce the extracts in sufficient amounts and at reasonable cost. Active substances have been obtained from the posterior lobe of the pituitary gland in the form of pituitrin, a substance which has gained such wide usage in the second and third stages of labor and the treatment of intestinal distention.

Adrenalin or epinephrin, the active principle of the adrenal glands is now prepared synthetically. It is standardized and is at the hand of every physician and surgeon to be used both medically and as an adjunct to local novocaine operations. More recently still the brilliant studies of Kendall, of the Mayo clinic, have resulted in the better understanding of the chemical nature of the active principle, thyroxin, of the thyroid gland. Thus far this principle has been obtained only from the thyroid glands themselves but we feel sure that it will not be long before the true chemical structure will be recognized, whereupon thyroxin can be manufactured in the laboratory and placed at the disposal of the awaiting medical profession. In the end chemical studies will doubtless prove to be of the greatest import, for after all are not the very life processes themselves evidences of physical chemical change?

After this very brief survey of some of the fundamental methods of investigation used to further our knowledge concerning the ductless glands, it may be of interest to speak of the more specific changes, particularly with reference to growth and development, which one finds associated with disturbance in the individual endocrine organs. Before speaking of these clinical states, it is well to mention the phases of secretory activity which would apply to practically any of the ductless glands, namely, we speak of hyperfunction, normal function, hypofunction and dysfunction. Hyper and hypoactivity mean, of course, as the words imply—too much and too little secretion of an individual gland. There is one other term which is applied to describe a disordered secretion and that is dysfunction. By this we mean that regardless of where the secretion is elaborated and whether in too great or too little quantities, the chemical nature of the secretion is probably altered by the disease processes of the gland. This is probably the case when tumors involve the gland or when chronic infections like tuberculosis and syphilis have attacked the organ.

Let us consider first the pituitary gland or the hypophysis. It is, of course, beyond the scope of this paper to go into the detailed clinical phenomena which are present in pituitary disease, and, therefore, I shall restrict my descriptions largely to the manifestations in growth and development, particularly skeletal development since this bears more directly upon the

field in which you as orthodontists are interested. In hypopituitarism in infancy or childhood, we are concerned with a condition which has been called dystrophia adiposogenitalis, as described by Fröhlich. Fröhlich first drew attention to this syndrome in 1901. The condition is characterized by a rapidly developing adiposity, congenital infantilism and myxedematous cutaneous changes, produced by pituitary tumor with deficient secretion. There is a characteristic distribution of the adipose tissue, the genitalia are infantile, and there is an absence of hair on the genital, axillary and trunk regions. There is an early inhibition of growth and ossification. The skin is strikingly delicate, sometimes dry and slightly scaly, and there are myxedematous-like swellings occurring in the skin. Males afflicted with such a condition remain beardless, the normal changes in voice do not occur, and the *vita sexualis* is undeveloped. In pituitary insufficiency there is a diminution in the metabolism, particularly in the excessive stages of adiposity. This has even been shown to be the case in dogs in whom the hypophysis has been removed. The reason for the excessive accumulation of fat in pituitary deficiency is doubtless due to the decreased metabolism and to the high tolerance for carbohydrates. This was first shown to be the case experimentally, by myself together with Cushing and Jacobson, and was demonstrated in dogs in whom a partial removal of the pituitary body was done. Almost immediately following the operation, the tolerance for carbohydrates was high. There was a tendency to increased weight just as we see in the clinical cases. A very characteristic finding in pituitary deficiency occurring early, is the inhibition of growth. Individuals suffering with, for example, pituitary tumor occurring before growth has been attained, are of small stature. In practically all cases in which the disease begins at the transition from childhood to adolescence, a retardation of growth has been noted. A great many cases of this kind have been described in the last few years. As a consequence, types of true infantilism result, in which there is an early pituitary deficiency. Where the pituitary deficiency is at all marked, there is disturbance in the appearance of the ossification centers and in the growth of the bone, though the closure of the epiphyses may occur about the normal time. In addition to these general manifestations there are, of course, local manifestations produced by tumor of the pituitary, and of these I may mention the enlargement of the sella turcica and symptoms produced by local pressure, such as headaches, disturbance in vision, optic atrophy at times, and psychic disturbance. The x-ray examination of the skull reveals a widening of the sella turcica with destruction of the primary process and sometimes with erosion of the floor of the sella. The x-ray also helps to determine something with regard to the skeletal growth, inasmuch as in several cases of pituitary deficiency, there is a delayed appearance of the ossification centers and as a result dwarfism may occur.

Since the principal functions of the fetus and developing child are growth and cellular hyperplasia of the various systems and organs and since we know that the importance of certain if not all of the ductless glands, such as the thymus and thyroid, is far greater to the growing organism than

to the adult, it is readily understood that any influence which might injure the normal function of the gland, would have greater detrimental effect than in the adult organism which had attained its growth. Again, the correlation between these glands and the different systems in the growing child is closer and far more active than in the adult, a fact which has been abundantly proved by evidence obtained from experiments on young animals as compared with similar experiments on adult animals. As a good example of this may be mentioned the fact that experimental pituitary deficiency exerts a far greater inhibitive influence upon the development of the sexual system in young animals than in adults who have attained normal development. As a consequence, we have to reckon in the young organism with additional and secondary developmental effects produced by a retarded sexual maturity. Thus in the growing organism it is important to have a proper function of every gland and organ in order to avoid interference in the orderly progressive differential development of every tissue in the body including such as the nervous, osseous and glandular systems. One of the glands whose proper function is of the greatest importance to the fetus and the growing child is the thyroid.

A brief account of the results which one may expect as a consequence of deficient or absent thyroid secretion in infancy and childhood may be given. Thus, absence of the thyroid or its secretion results in one of the most striking types of infantilism, namely, dwarfism. This condition is characterized by disturbance in ossification as is shown by the excessive retardation of development in the ossification centers, in the closure of the epiphyses, and further in the disturbance of the development in the bone. The bone formation so far as it has taken place is, however, of abnormal density. There are, furthermore, disturbances in dentition and in the development of the nervous system in which the mental development particularly suffers. There are also the characteristic myxedematous skin changes and disturbances in the development of the genital apparatus leading to the element of dysgenitalism. It is probable that though the primary and essential feature of the disease is the absence or diminution of the thyroid secretion, there are added secondary features dependent upon disturbance in function of the remainder of the ductless glands.

The second form of dysthyrogenous infantilism is that known by the term of endemic cretinism and myxedema. This condition is not only dependent upon goiterous degeneration of the thyroid gland, but it is very probable that the damaging factors in cretinism influence directly the central nervous system and the other ductless glands, such as the hypophysis, and thus cause the manifold variable characteristics seen. Such cretinistic individuals remain very definitely retarded in growth. The disturbances are not necessarily proportionate. Thus ossification may in one instance be principally affected. In another the developmental disturbance of the central nervous system may be predominant. Sometimes the retardation of growth is most noticeable and in other instances the disturbance of the developmental sphere of the hypophysis may be most noticeable. Again, it is a well-known

fact that sporadic myxedema may occur not only with its clear-cut signs and symptoms, but also with its less evident manifestations known as "formes frustes." This has led authors such as Huebner and Brissaud to regard all forms of delayed development as dependent in large measure upon a state of dysthyroidism, and, therefore, have recommended treatment with thyroid or thyroidin in all these cases.

Thus far I have considered the hypothyroidism states as they affect growth and development. When we consider the hyperthyroidism states, we find that effects of this nature are very much less pronounced. The reason for this doubtless is that hyperthyroidism as we see it, dependent upon adenoma of the thyroid gland or in the well-known condition of exophthalmic goitre, almost invariably occurs after puberty and usually at the age of 20 to 40, and hence as you see after the period of growth has passed. Consequently, one should not expect developmental changes as a result of hyperthyroidism occurring after the growth period is passed.

Our knowledge of the secretory function of the pineal gland is still shrouded in mystery and until we understand more of the real function of this gland, it will of necessity be impossible to determine the relationship of the latter to the development of the organism. Neither by extirpation of the gland (Dandy) nor by injections of its extract have any definite physiologic functions of this gland been discovered. There is, however, a somewhat general supposition that there is a close relationship between the pineal gland function and growth and sexual development. Horrax reports a stimulating effect exerted by the feeding of pineal extract on the sex glands. Cases of tumor of the pineal gland exhibiting adiposity with sexual infantilism on the one hand and with abnormal increase in stature and precocious sexual development on the other have been described. Whether the pineal function is primarily responsible for these interesting findings is still in doubt, for with tumors of the pineal gland or its neighborhood there is usually an accompanying internal hydrocephalus which may give secondary pituitary deficiency manifestations by interference with the normal secretory process of the hypophysis, which gland as we have seen, is closely related to general development and the acquirement of sexual maturity. V. Frankl-Hochwart regarded the abnormal increase in stature, hypertrichosis, obesity and premature sexual development with precocious adolescence as signs of hypopinealism. If this is true, primary hyperpinealism should be associated with an infantile stature and sexual infantilism, and it is desirable that the pineal gland should be remembered when cases of this kind are met. It would seem then that the functions of the pineal gland are directly antagonistic to those of the hypophysis. It appears then that at the present time it is safe to assume that as a result of certain disturbances of pineal function clinical conditions of infantilism are produced, but that convincing proof of this is lacking.

THYMUS

Thymus hypertrophy and hyperplasia is unassociated with developmental disturbances with the exception possibly in those cases in which the thymus

hypertrophy and hyperplasia is an evident accompaniment of other conditions in which there is general lymphatism as in *status thymicolymphaticus*. One would not expect atrophy or tumor destruction of the thymus to lead to any outspoken retardation of development, since we know from the work of Park and McClure that there are no observable effects produced by the extirpation of thymus gland in young animals. Primary hypertrophy and hyperplasia of the thymus that is unassociated with other diseases is very rare. In fact, it is doubtful whether the thymus has an internal secretion and therefore it is difficult to conceive a clinical syndrome of primary hyper and hypothyroidism. Recent experiences, such as those of Park and McClure, have shown that the thymus is not essential to the life of the organism. Therefore we conclude that the thymus does not exert an influence upon growth and development. Clinically those cases of thymic hyperplasia have awakened the most interest. In 1889 Paltauf drew attention to the frequent association of thymus hyperplasia and *status thymicolymphaticus* with cardiovascular aplasia, and attributed the cause of death in these cases not so much to mechanical pressure as to the disturbances in the vegetative sphere resulting in what he called the lymphatic chlorotic constitution. The frequent occurrence of thymus hyperplasia in diseases of the ductless glands, suggests that it is probably an incidental factor rather than that the hyperplastic thymus is a cause of the developmental disturbances resulting from such diseases. This is an important conception to get because of the fact that so many of the anomalies seen in childhood have been attributed to the thymus.

PANCREAS

The so-called pancreatic infantilism is probably dependent upon true nutritional disturbances and not upon disturbances of the internal secretion of the pancreas. In fact, disturbances in the internal secretion of the pancreas do not as a rule lead to infantilism, for in diabetes as it occurs in children, there are no accompanying evidences of infantilism in growth or in the general features. There is no retardation in ossification in cases of diabetes occurring in childhood. With the large amount of experimental work which has been done upon the pancreas, such as partial and total extirpation of the gland and the ligation of the ducts with the destruction of the acinar tissue leaving the island tissue intact, there are no instances of direct disturbance of corporeal development. Similarly, there have been no clinical instances reported of retarded development dependent upon diseases of the pancreas other than those cases which can be explained upon a basis of nutritional disturbance in which the alimentary factor is the predominant one.

ADRENAL

The developmental disturbances dependent upon damage to the adrenals in childhood have been too little investigated to allow of a clear differentiation from the true dystrophic types of infantilism. Hypoplasia of the chromaffin tissue appears not to lead to true infantilism. It is possible, indeed probable, that such cases of this nature belong to the so-called hypoplastic types of

Bartel or to true status thymicolymphaticus. Falta cites instances in the literature of hypoplasia of the chromaffin tissue combined with the narrowing of the vascular system, hypoplasia of the genitalia, status thymicolymphaticus and hyperplasia of the thymus gland. According to Wiesel such individuals are particularly predisposed to Addison's disease. Acute destruction of the adrenals can occur as a result of hemorrhage, of thrombosis of the adrenal veins or of suppuration. Simple atrophy or sclerosis is, however, more common. The frequency of tuberculosis of the adrenals in Addison's disease should be mentioned. It is worthy of note that in infectious diseases and intoxications the adrenals are very often involved. Diphtheria toxin has a particular affinity for the adrenal. Edema, necrosis and hemorrhages of the adrenals may occur in the infectious diseases. In many cases it seems that an insufficiency of the adrenal apparatus, and particularly of the chromaffin tissue generally leads to cardiac insufficiency. A case of v. Recklinghausen quoted by Falta is reported, in which a very chronic tuberculous caseation of both adrenals was found in an eighteen year old dwarf who had died in convulsions. Falta would regard the tuberculous involvement of the adrenal in this case as an accidental complication, and not responsible for the dwarfism.

In cases of adenoma of the cortical portion of the adrenal in which such hyperplasia has taken place in youth, abnormally rapid growth of the organism is described. There are to be found in addition premature development of the secondary sex characteristics and of the genitalia, and in adults an abnormally abundant growth of hair. As a consequence, it would appear that in those cases in which the opposite appearances are found, we are probably dealing with an insufficiency of the adrenal cortex. If this grave anomaly, dwarfism, were the result of adrenal insufficiency, we would have to regard it as an insufficiency of the cortex alone which would hardly be probable because we know that hypoplasia of the chromaffin tissue itself tends to the development of asthenic individuals of considerable stature, however. In brief, then, in the consideration of the cases of maldevelopment which have been attributed to the deficient function of the adrenal cortex, it would seem that a relationship has not been proved. It seems, however, from the evidence at hand, that the adrenal cortex has a definitely stimulating influence upon the genital sphere and particularly upon the hairy development, a conception which as we shall see, receives considerable support from appearances resulting from hypoplasia of the adrenal cortex. Thus, for example, tumors of the adrenal are stated to be frequently associated with adrenal overfunction. The latter has been assumed because of the fact that there is in some of these tumors an increased adrenalin content. As a result of the overfunction in cortical tumors of the adrenal in children, we find an enormously increased development of the body and premature development of the genitalia. These overfunctioning cortical tumors are probably in most cases adenomata and hypernephromata. Puberty may appear considerably earlier than normal. A careful review of the literature is found in the article of Neurath (*Über Fettkinder*). Two representative cases as quoted by Falta

may be given. The first case of Linser is that of a boy five and one-half years old, who gave the appearance of a youth and for that reason was admitted to the men's ward in the hospital. He was 138 cm. in height, the penis measured 8-9 cm. in length, the testes were pigeon egg in size, and the prostate was of the size found at 15 years of age. The body was adipose, the musculature was very well developed, the stature large and ossification almost complete. Dentition corresponded entirely to that of a boy of 15 years of age. The length of the trunk was greater than that of the lower extremities. The childish measurements were thus preserved in accentuated form. The hypophysis was normal.

A second case of Bullock and Sequeira is reported of a girl eleven years old, who appeared like a woman of forty. At the age of nine and three-quarter years menstruation appeared and from this time onward increasing adiposity became noticeable. The girl was four feet six inches in height, weight eighty-seven pounds, the breasts were fully developed, and the hair of the pubis and genitals was long and present in abundance. At autopsy a large tumor of the left adrenal was found consisting of cells of the zona reticulata together with numerous metastases. There were also found hyperplasia of the thyroid and parathyroid, a completely developed uterus and large ovaries with corpora lutea of recent development. The striking features of the clinical pictures in these cases, as indicated by Neurath, are the premature and excessive development of the genitalia and of the secondary sex characters. Furthermore, in all cases there is adiposity, increased growth of body often with persistence of the infantile measurements and accelerated ossification and dentition. The mental development of these children usually does not progress equally with that of the body development, and the acquirement of the sexual function is retarded.

SEX GLANDS.—EUNUCHOIDISM

Cases of eunuchoidism are not at all rare. Tandler and Gross have adopted the term eunuchoid, which was first used by the English authors, because it is the one most generally used and because it emphasizes the similarity of this condition with the true type of eunuch. Two types of eunuchoids are distinguished, the first characterized by the eunuchoid growth in height and the eunuchoid disproportion of body which are produced by the increased growth in length of the extremities, both of the arms and the legs. We find also signs of skeletal underdevelopment or immaturity in the open epiphyses which may remain so for years after the normal time of closure. In addition a definite saddle nose, together with alterations of the pelvis and genu valgum are not infrequently found. At times the total length of such an individual is not in excess of the average, in fact, it may be below this in spite of the increased growth of arms and legs. In such cases the disproportion of the body mentioned above remains as the sign diagnostic of the eunuchoid type of stature. This disproportion also distinguishes the eunuchoid type from the infantile in so far as infantilism implies the persistence of the childish corporeal proportions. The second type of eunuchoid-

ism is characterized particularly by the eunuchoid adiposity. The skeletal disproportion, the open epiphyses, the changes in the pelvis, genu valgum and in addition the characteristic adiposity, particularly as to form and localization, are present here. Just as in the type of the castrated individual so here the deposit of fat is particularly marked on the hips, in the eyelids, in the mammary glands, in the lower abdominal regions, at the cristæ iliacæ and over the nates. The skin changes (geroderma) and the distribution of the hair correspond to those found in the eunuch. The external genitalia are small, the testes are underdeveloped, the seminal vesicles may be altogether absent and the prostate is small. Microscopic examination shows often marked retrogressive changes or even entire absence of spermatogenetic development. The epididymis may be large in comparison with the body; the testes are often composed of thick walled tubules with small lumina. The prostate is mostly fibrous, the glandular substance being slight in amount. In fact the entire genital apparatus fails to develop. The interstitial cells may be entirely absent as shown by postmortem examination.

The underdevelopment of the sex characters is indicated by the hypoplasia of the genitals, by absence of the crines pubis and by the relatively deficient deposit of fat in the lower abdominal regions and over the nates. The amount of fat accumulation is not the important thing, it is rather its localization as indicated above which is characteristic. Underdevelopment of the mammary glands is also found. Menstrual disturbance in the older women is a common finding.

The somatic peculiarities of eunuchoid individuals in general correspond to those of the castrated individual and are distinguished merely in the degree of their development, thus we find not only underfunction of the sex glands as shown in absence of sex characters but also changes characteristic of somatic underdevelopment or immaturity, such as persistence of the thymus, open epiphyses and disturbances in metabolism like those found in eunuchoid adiposity. If the underfunction of the sex glands develops slowly and gradually, the changes produced are much more varied in eunuchoidism than in the conditions found after castration. In eunuchoidism we are concerned chiefly with a congenital underdevelopment of the sex glands as a result of which changes are produced which resemble those in early castration. The cases of early damage to the sex glands must be distinguished from those in which the damage to the sex glands occurs after puberty, as a result of infectious diseases, such as parotitis, typhus, tuberculosis and lues. In these changes analogous to those occurring after late castration are seen.

Certain other bodily characteristics have been found to be associated with disturbances in other ductless glands, and may resemble those depending upon sex gland disturbance. It is highly probable that in these cases the sex glands are in many ways complimentary, a relationship we know to exist between the hypophysis and the sex glands. We know that there are two secretions of the sex glands, one derived from the gametes which is intended for the generative function and the other derived from the interstitial tissue which furnishes the internal secretion or hormone which in turn has a very

definite influence upon the development of the body as a whole and upon its various organs, according as to whether this secretion is increased or diminished in amount or altered in character.

The prognosis and treatment in those types depending upon diseases or disturbances in the realm of the glands of internal secretion is in many instances more favorable, particularly if the primary disturbance, such as tumor of a certain gland, has been removed and the symptoms of deficient glandular activity are counteracted by glandular feeding. This is particularly true of those cases of pituitary infantilism in which tumor of the gland or of its neighborhood has been surgically removed and in which subsequent feeding of pituitary extracts has been instituted. The good results obtained by the feeding of thyroid extracts in case of thyroid deficiency need only be mentioned. With the discoveries of the active principle of the ductless glands, it is probable that better results can be obtained by hypodermic injections of these active principles in suitable cases. At the present time the dosage of the gland extracts or of their active principles is still upon an empirical basis and treatment must be guided by experience and by results obtained.

Glandular transplantations have offered little hope of benefiting conditions of ductless gland deficiency, for they have been practically uniformly unsuccessful. Experimentally, autotransplants have "taken" very well indeed, but in clinical conditions of glandular underactivity it is obviously impossible to obtain a graft suitable for transplantation. A mixed opotherapy, as recommended particularly by the French has been attended by some success, in cases exhibiting pluriglandular symptoms. Combinations such as a mixture of thyroid and pituitary extracts or pituitary and ovarian extracts have been used and improvement reported. In the cases with organic ductless gland lesions of a surgical nature, operative measures are naturally indicated with subsequent administrations of gland extract.

To summarize then we may say that by the term infantilism we mean the cessation or retardation of development in which the corporeal, morphologic characteristics appertaining to infancy or childhood persist beyond the ages at which they are normally found. There are two large groups and a possible third group of cases of infantilism, namely, those belonging to the group of true dystrophic infantilism, those dependent upon primary disease of one or more of the ductless glands and those classed under partial infantilism. In the true dystrophic type of infantilism, there is a more or less uniform cessation or retardation of development dependent upon a general damaging influence on all the organs and tissues of the organism, of toxic or disease origin and arising either in intrauterine life or in early infancy or childhood. There may be a psychic infantilism combined with the corporeal type. In other cases of this dystrophic type the etiologic factors are entirely unknown.

A second large group of cases belong to the type of infantilism caused by primary disease of one or more of the ductless glands. This type illustrates so well how important for the growth and development of the organism is the proper functioning of all the ductless glands. With the disturbance in one

there are secondary disturbances in the other glands. There is, however, a characteristic stamp upon the disease syndrome produced by the gland primarily and principally involved and this permits of a proper diagnosis and aids greatly in instituting proper therapy. There are many instances in which the ductless glands are certainly involved, in which cases however the disease syndrome is not characteristic of a primary affection of a single gland and to which the term pluriglandular disease is applied. Finally, instances of partial infantilism are described in which individual organs, tissues or systems are more directly affected and the organism as a whole being relatively little retarded in its development.

IDEALISM AND ORTHODONTIA*

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LIFE at times appears somewhat paradoxical. This is realized when in the drifting currents of events we are suddenly confronted by an unexpected turn in their course. In shaping the destinies for ourselves, our goal is set and we are usually so impressed by our convictions that little room is left for doubt as to a probability of any other interpretation. Experience, however, teaches us differently. It is the opinion about us that determines the attitude we assume. That is, we are only what others think we are, and not what we aim to be. When Dr. Eby approached me with the request of addressing you this evening on the topic of Idealism, I was somewhat surprised. And for the moment I was really at a loss. Of all things on earth I never thought that I was an idealist. But on reflection it occurred to me that had he not thought me one he surely would not have made the choice. I thereupon consented. I did that with one reservation in mind, and that was, since this must come to a decision, I shall first have to state my views. Your unbiased opinion may then enable you to render a just verdict.

Idealism and orthodontia have been so closely and so continuously associated that it has become a tradition. At one time it was difficult to distinguish them. We did not know whether idealism in dentistry meant orthodontia or orthodontia, idealism. One fact must be acknowledged and that is that orthodontia owes much to idealism, and that the greatest idealist, in the estimation of all Angle graduates, is Edward H. Angle. None will refute the fact that due to his influence orthodontia stands today as a separate and distinct specialty. He *was* an idealist. And like all other idealists he had a *vision*. And in that vision he foresaw the possibilities of orthodontia. But to realize them, they had to be converted into facts. For instance, a school for the education of a specialist was necessary. He bent all efforts to realize it. When this was an accomplished fact, the necessity for a society was evi-

*One of three twenty-minute addresses given before the First Meeting of the New York Society of Orthodontists, Dec. 8, 1921.

dent. This was organized and as a monument to his efforts the American Society of Orthodontists stands today as the largest organization of orthodontists in the world. The next necessity was a journal. And as a result the first journal of orthodontia, "The American Orthodontist," was issued. As you are gathered here this evening for the purpose of organization it is proper for me to mention these facts and give credit to him who by his *idealism* made such progress a reality. It must, therefore, be admitted that orthodontia owes a debt of gratitude to the idealism of Edward H. Angle for its origin and culmination as a specialty.

Most, if not all, of his students mention with gratitude the high ideals that Angle instilled into them. These ideals, they maintain, are the background of orthodontic progress and constitute the stimulus for the ambition of uplifting and upholding the exalted position and the dignity of their specialty. While it is evident and must be admitted that the idealism of Angle was a necessary and an important factor in the realization of his "vision" it is rather ambiguous to conceive its application in the present status of orthodontia. Upon careful reflection it would appear that the word *idealism* has lost its original meaning and has reached the stage of a *catch-word*. Let us, for instance, examine what is really meant by it. *Ideal*, used as an adjective is a statement consisting of, pertaining to, or characterized by, or existing in ideas. It is therefore conceptional or mental. It describes something that is conceived as perfect, supremely excellent, or very desirable; as, ideal conduct; an ideal home. It is, therefore, visionary, fanciful and imaginary, and is apparently opposed to the real. For instance, we speak of an ideal commonwealth, ideal happiness. In art it is used to express something that exceeds ordinary reality, freed from commonplaceness or grossness, refined and imaginative; as, an ideal portrait; an ideal form. Can we in this sense also say ideal orthodontia? If we can, what does it imply?

As a noun *ideal* represents a product of thought and imagination, to which any corresponding real existence is not necessarily attributed, but which appears in consciousness as an object worthy of contemplation or aspiration. For example to the American, Washington is the ideal of a patriot; to me, Theodore Roosevelt is the ideal of an American; to the artist, Venus de Milo is an ideal of grace. It thus appears as a conception which exists only in imagination, fancy or idea,—a conception beyond realization; as the perfect circle is an ideal only. Therefore, it may be assumed that *ideal orthodontia* cannot exist.

Idealism (in philosophy) is that system of reflective thinking which would interpret and explain the entire universe, things and minds and their relations, as the realization of a system of ideas, or as the progressive evolution of an ideal. It takes various forms as determined by the view of what the idea or ideal is, and how we become sure of it.

Idealism is customarily regarded as, and in particulars often is, the antithesis of *realism*; but the extremes of each are obliged, while denying many, to admit not a few of the claims of the other. Thus, agnosticism, for example, admits the possibility of reality as independent consciousness, it nevertheless

denies of knowing such reality. Idealism, therefore, differs from agnosticism by refusing even to admit the possibility of a nonideal reality.

Idealism may also be said to consist in the quest of the ideal; the habit of forming ideals and of striving after their realization; i.e., the attainment of an ideal. This is the only sense in which it may be applied in orthodontia. But, if thus applied, in what frequency has it been found to be realizable? At this stage we inadvertently are confronted with the fact of *realism*. Because, the ultimate end of orthodontia consists in what it actually accomplishes. It matters little as to what we think of its possibilities we must eventually substantiate our contention by results,—the realizations of our hopes and endeavors. Thus, for instance *realism*, in art and literature, strives to portray things with scientific accuracy and detail, allowing comparatively restricted play for the imaginative faculty. Idealism, on the contrary creates from the imagination a type of beauty in conformity with a preconceived ideal. Idealism will thus be seen to cover a wide range in the field of art, from the work of pure imagination, in which no attempt is made to conform to facts to the representation of reality with only a slight tinge of modifying color, introduced to emphasize certain features or aspects of the work.

From this it will be evident that the very inception of an art is closely related to idealism. Healing was originally an art and in its early history teems with idealisms. Thus, the early healers were obsessed with the idea of the attainment of such complete control of the knowledge pertaining to life as to be able to create it. The recent production upon the screen of the "Golem" portrays this attitude. The idea conveyed therein is not a purely fanciful modern conception, it is based on many traditional and recorded anecdotes, fables and tales. Orthodontia, the most recent branch of the healing art, is as yet still striving for the attainment of the ideal. The very foundation upon which orthodontia is built is still conceived as an ideal. Thus, it is said that normal occlusion is the basis of orthodontia. Normal occlusion is the ideal which every orthodontist is striving to attain. The *means*, or mechanism, with which this may be realized consists in an ideal appliance, the perfection of which though progressing with varied success has as yet not been accomplished. The stoicism of the conscientious and thorough orthodontist in his trials and tribulations, his persistency and perseverance in the treatment of malocclusion is the characterization of an ideal determination. It would seem, therefore, that idealism in orthodontia was essential in starting things agoing. Is it essential now? Must it ever remain unchanged? Can it be realized in its original conception?

Orthodontia in recent years has made its way from the speculative, imaginative and subjective realm into that of scientific reality. That is it has come down from the pedestal of idealism and invaded the realm of fact. From the sphere of imagination it has descended or rather *risen* to the domain of understanding. We are beginning now to understand. For example, normal occlusion was hitherto pictured as an ideal. No one could approach it. About a year ago I had the privilege of proving it to be a demonstrable fact subject to scientific investigation and realizable by all. This fact which may be tested

and verified, while still remaining the ideal of the orthodontist is, nevertheless, changed in its aspect. Namely, instead of appearing as a personification of unimpeachable perfection, it looms up as a biologic phenomenon and is variable in its manifestation. Thereby, the attainment of this ideal in orthodontia is made more hopeful, because it is realizable.

The conditions underlying the possibility of attaining it also changed. At one time, it was deemed that the possession of the ideal mechanism will yield the normal in occlusion, and that in every instance. The ideal in mechanics is a visionary illusion. The nearer we seem to get to it the further it recedes. Experience has taught that the normal in occlusion is obtainable. But, it is obtainable not in exactly the same measure, and not in the same manner. Besides a perfect mechanism, knowledge, ability and skill are paramount. It is the man behind that counts more than the appliance.

The classic ideas about the causes of malocclusion have recently also experienced a jolt. We are in this respect also beginning to realize that most of the formerly propounded causes were really imaginative. They fail to stand the test. As shown in a paper read by me at the last meeting of the American Society of Orthodontists, most of the accepted causes prove negative when examined by the more scientific methods of today.

It is therefore necessary at present to have a clear understanding of this shift in the meaning of some words, words which originally meant something different than they do now. *Ideals* and *visions* as we understand them now were an essential at the stage of inception of orthodontia. Orthodontia however, has not only evolved, it has also developed and grown. Today high professional principles, keen observation, collection of data, classification of facts and interpretation of their significance are more conducive to the elevation and progress of this specialty than *ideals* and *visions*. High principles will help considerably in maintaining the dignity of a profession. These can be cultivated by association. This body, I am in hope will be organized for such a purpose, exclusively. Observation helps to see facts as they are. But for them to be of value it is necessary that they should be recorded. Then, by study of an adequate accumulation of facts, their meaning may be interpreted. From them certain truths are learned. And when an adequate range of truths have been thoroughly assimilated, we are in a better position to think more judiciously and cultivate a better appreciation of the various phases of orthodontia as we are confronting them in our daily experiences. This is the scientific method of procedure. For science is nothing more than tested and verified truth. Moreover, this is my belief and to this standard I aim to live up. If you would call this idealism, then I am an idealist of the highest order. I call it *devotion* to exalted principles. And *discipline* to execute them. The only way I could reconcile *idealism* with the *realism* in modern orthodontia is by substituting the meaning of certain words with that of others.

Thus, Let *idealism* mean *high principles*, because these are essential for the dignity of orthodontia.

Let *vision* mean *observation*, because this is the eye of intellect.

Let *imagination* mean *actual facts*, because we must face them at all times.

Let *belief* mean *ignorance*, because when we don't know we are easily led to believe.

Let *fancy* mean *error*, because it is necessary to admit it when we are wrong.

By a foundation of orthodontia on the basis of high principles backed by discipline, observation of actual facts, admitting ignorance and eliminating error, distinctions will be cultivated that must tend to a higher knowledge and better understanding. In this manner the profession will be vested with power and influence that none can rival. This power in turn being for the good of all will surely earn the admiration, esteem and respect of humanity. Let us then organize if this be the way to the goal, and by a united effort realize the *idealism* of the founders of this specialty and by our conduct aim to *idealize* our own *realizations*.

DEPARTMENT OF ORAL SURGERY AND SURGICAL ORTHODONTIA

Under Editorial Supervision of

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THE IMPACTED MANDIBULAR THIRD MOLAR*

BY VAL H. FREDERICH, D.D.S., ST. LOUIS, MO.

DENTISTRY today is engaged in an effort to solve the many perplexing questions confronting it. Of the numerous complicated problems before us, probably none is more important or more difficult of solution than that of the impacted mandibular third molar. The pathologic significance and treatment of other infected and impacted teeth are identical with those of the mandibular third molar, so what is said at this time applies equally to all. The watchword in dentistry today as in medicine is prevention. In the past we have relied entirely too much on symptoms, permitting disease to progress until real damage was done rather than anticipating the damage and treating the cause in time to prevent subsequent difficulty. The writer makes no claim of originality but is presenting the evidence as he has found it in actual practice coupled with a study of the thoughts of others.

The rôle that impacted, unerupted or infected teeth play in the production of lesions about the jaws, brain, nervous system, the circulatory and respiratory systems and in fact the entire physical economy has long been recognized. There is nothing new about this, but as in many other instances we have permitted our knowledge to lie dormant until perhaps some casual happening has aroused it. Many years ago our foremost educators taught us that damage was being done by faulty eruption of teeth; and it behooves us, therefore, that we take these teeth into consideration in making a diagnosis of obscure lesions wherever found. This is equally true for the physician, as only too often does one find a patient being treated for a serious malady whose mouth is reeking with filth.

ETIOLOGY

Of the different impactions, the mandibular third is the most frequent, the canines come next and then follow the maxillary third and the premolars

*Read before the St. Louis Dental Society, March 6, 1922.

and molars. There have been many theories advanced as to the etiology of impacted teeth. Abnormal embryonic development is a probable cause, especially in those cases where the impacted tooth has taken an inverted position or perhaps a lateral position. In these cases the tooth bud was probably displaced in embryonic life and continued its development, erupting abnormally or not erupting at all.

Malnutrition, syphilis, rickets and cretinism have a decided influence toward impactions, since they have a direct bearing on the bony growth. Eruptive fevers is given as a cause by some as also is artificial feeding.

Inflammatory conditions of the bone or the peridental membrane brought about by caries or severe orthodontic procedure is a probable cause. In this case the cancellous tissue instead of remaining soft and more or less elastic becomes hard and unyielding, due perhaps to a secondary deposit of dense bone in the cancellous structure. This would necessarily tend to retard eruption, if not prevent it altogether, or cause the tooth to erupt in malposition.

The premature loss of the deciduous teeth causing a contraction of the dental arch seems to be rather a prolific cause. In this instance the third molar, erupting rather late in life, would be compelled to utilize what little space was left if any and an impaction would again be the consequence.

There are many other causes given by various writers on the subject such as: perversions, neurosis, anemia, scurvy, idiotism, severe traumatism to the jaws causing a deposition of lime salts in the cancellous tissue, retarded eruption of the deciduous teeth causing abnormal density of the cancellous tissue, etc. No doubt there is a certain amount of logic for each.

While the preceding etiologic factors are accepted generally by scientific men as being correct, nevertheless, the idea of evolution has always had a strong following. There can be no question but that the human being is losing ground physically, argued from the standpoint of primitive man. It does seem that at one time all the teeth were useful and even necessary. With our present day methods of cooking and eating this is at least a debatable point and nature is possibly throwing off an organ that is no longer useful or necessary. The change is noticeable even in our own time, say the last twenty-five or fifty years. Many of you will remember perhaps the neighborhood butcher preparing fresh meats for immediate consumption. At the present time with the large packers preparing the meats, we must have meats that are aged for six months or a year so that it is so tender that a fork will suffice to pinch off a piece. This for fear that we might be compelled to use our teeth and jaws as nature intended us to do. We all know very well that a human organ that gets no natural stimulation through proper use undergoes atrophy. Darwin mentions this matter of the degeneracy of the teeth in his book on "The Descent of Man." He says that it appears as if the wisdom teeth are becoming rudimentary in the more civilized races of man. He also makes the same observation regarding these teeth in the chimpanzee and the orang, attributing the changes to the soft foods of civilized man and the reduced use of his teeth and jaws.

PATHOLOGIC SIGNIFICANCE

An impacted tooth gives rise to certain pathological phenomena. Perhaps the simplest of these is the local inflammation of the soft tissue or gum surrounding the tooth. This is brought about by an overlap of the soft tissue, which normally should be distal to the third molar, becoming traumatized in the process of mastication. Food particles and bacteria find lodgment under this loose flap of gum tissue and infection readily takes place. The inflammation frequently extends over a large area invading the muscles of the cheek and often the tonsillar, parotid and submaxillary regions, resulting in a trismus of pronounced severity at times and very often most agonizing pains. The pain may be constant or experienced only when opening the mouth. Infection may follow in the tissues of the tongue and floor of the mouth causing symptoms identical with Ludwig's angina and thus endanger the life of the patient. The infection once started may gain access to the lymphatics of the neck and lead to general septicemia, pyemia or other complications, when the recovery would be extremely doubtful depending on the resistance of the patient and other factors governing such affections. These severe attacks often follow a series of milder ones, which sometimes yield on their own account or with mild irrigations and the application of iodine. The excision of the superimposed gum flap is poor practice in the opinion of the writer as it seldom does any good and often makes matters worse.

The proper surgical procedure is the removal of the tooth. Many operators feel that the removal of the tooth should not be resorted to in the acute stages, and while this objection has some merit, nevertheless in the majority of cases it is based on needless fear. If the inflammation has localized at all, the best and most satisfactory procedure is extraction. However, it is not always safe to extract in the acute stages and here the judgment of the operator needs to be well balanced. There will be plenty of clinical evidence to guide him. The patient will show some temperature, the eyes take on a peculiar appearance, somewhat glassy, the face may be flushed but more often assumes a pale and pasty look, the edematous gum tissue will be red and dry, there might be an involvement of the lymph glands in the submaxillary region and in a general way the patient will present a picture of sepsis. In these cases, if the symptoms warrant, it will likely be best to put your patient to bed for a few days, employing prophylactic measures in the mouth such as irrigating around the tooth and under the superimposed gum flap, employing counterirritants thoroughly over the inflamed area, perhaps using a cold pack and keeping the organs of elimination active. In a few days the patient should be well enough to proceed with the removal of the tooth.

If the operation must be done at once and if the inflammation is very extensive, especially to the distal, a general anesthetic should be employed. To use a local or a conduction anesthesia in these highly inflammatory cases is not without danger on account of the possibility of forcing some of the infection into the deeper tissues causing added complications.

Another pathologic condition which we find as the result of impacted

teeth is abrasion of the second molar. The enamel of the crown of the third molar, pressing against the softer structure of the roots of the second molar, will cause an abrasion or cavity of more or less magnitude. This abrasion may be sufficient to cause continued irritation of the second molar pulp or even cause the death of it. Caries often follow the abrasion and an abscess is the result. It can readily be seen that marked nervous disturbances and neuralgia might be suffered from this irritation of the pulp by means of a referred or reflex action. The writer has seen abrasions of this variety extending into the pulp chamber of the antagonizing second molar.

The impacted tooth might cause a very severe condition by direct irritation and direct pressure against the inferior dental nerve. In cases where the root ends had not yet completely developed, the sharp edges might bear against the pulp tissue itself causing intense irritation. This is given by some authors as being a factor in chorea, epilepsy and other neurotic tendencies. There seems to be plenty of evidence showing that certain forms of insanity, hysteria, melancholia, insomnia, etc., owe their origin to impacted teeth. There may be no pain in the tooth itself at any time, but the long-continued, constant irritation seems to be sufficient to produce the serious effects described. The late Dr. Henry S. Upson laid great stress on impacted teeth as an etiological factor in nervous afflictions.

Dermatologists believe that there is some connection between partial baldness (so-called alopecia areata) and impacted teeth. They state that this condition is due to some form of irritation of the fifth nerve, which makes it quite possible that impacted teeth form the basis. It is claimed that in the University of Michigan, the departments of Oral Surgery and Dermatology have, within the last two years, observed the recovery of ten cases of alopecia areata after the removal of the impacted teeth.

Impacted teeth will frequently crowd the dental arches to such an extent, as to cause marked irregularities in the alignment, manifested mostly in the canine and premolar regions.

It is not infrequently found that impacted teeth will lie dormant until very late in life and then give rise to the formation of abscesses or cysts. The writer personally knows of three cases of apparent lesions in the mouth that were diagnosed by prominent men as cancer. The error of diagnosis was not disclosed until operation was resorted to, when it was found that an impacted tooth had caused the breaking down of the tissues, leaving a ragged opening that much simulated a malignant growth. Two of these cases occurred before dental radiography became popular, and in the third case the writer discovered the error himself, the patient being a personal friend. The ages of the patients referred to were over 60 and 70 years.

TECHNIC OF REMOVAL

The technic for the removal of the impacted mandibular third molar will depend upon the difficulty anticipated, and the difficulty is in direct ratio to the degree of impaction. It is probably correct and fair to say that the great majority of impacted third molars present but little difficulty, to one

experienced in tooth removal, however much they may seem a bugaboo to the uninitiated. The fact is that the simpler forms of impacted third molars offer far less difficulty than a firm first or second molar if the operator is well versed in the use of elevators. No absolute method or technic can be laid down for the removal of these teeth because no two are exactly alike, neither is the condition of the supporting osseous structure always the same. We can speak of general principles only so far as technic is concerned. Then, too, the personal equation enters, and what might be advantageous for one man may be simply useless to another.

SIMPLE IMPACTIONS

For the removal of the simpler forms of impactions the writer prefers the use of nitrous oxide and oxygen as an anesthetic. By simpler forms of impactions it is intended to include all those in which the impacted tooth, inclining toward the mesial, impinges on the distal surface of the second molar, not below what would be the middle point between the occlusal surface and the gingiva; also those standing in a fairly vertical position but somewhat depressed and perhaps covered completely with soft tissue. A good radiograph is a primary requisite. None but the simplest cases should be attempted without one and then it is not always safe. The *modus operandi* to be followed should be studied from the radiograph plus the oral cavity itself and well fixed in the mind of the operator. The field of operation should be sterilized as to gross sepsis and all other surgical precautions should be exercised throughout the entire operation. Anesthesia is induced, the jaws propped apart sufficiently, and gauze sponges placed posteriorly so that nothing can drop down the trachea or the esophagus. At this time, if it is deemed necessary, an incision is made through the superimposed gum tissue straight back along the upper surface, with either a sharp gum scissors or a scalpel. For those partially covered with soft tissue a sharp gum scissors is generally preferred, while for those completely covered a scalpel is used. The elevator is now inserted at the mesio-buccal corner of the third molar, and is directed downward and to the lingual, finally occupying a position on the mesial surface of the impacted tooth as far down toward the apex as possible. A prying motion is now used to dislodge the tooth forcing the tooth backward and upward out of its socket. Any elevator might be used that suits the fancy of the operator. There are a number of makes on the market. It is not necessary to insist upon the complete removal of the tooth with the elevator. The writer often uses a forceps to pick the tooth out of its socket after the elevator has thoroughly dislodged it. Impactions of this class lend themselves readily to rapid and spectacular operations.

COMPLICATED OR DIFFICULT IMPACTIONS

The technic for the removal of the more difficult and complicated impactions is quite a different matter, and one that taxes the ingenuity and skill of the operator to the utmost. For this class the writer employs conduction anesthesia entirely, unless forced by stress of circumstances to do otherwise. The reason is obvious. With this method of anesthesia there is ample time

for the worst case, complete freedom from pain, reduced hemorrhage, ready cooperation of the patient, less strain on the operator, less fear for the safety of the patient as regards the anesthetic, opportunity to keep the field of operation free from bacteria laden saliva, and the possibility is presented of keeping the landmarks of the operation clearly before you so that the tissues may be traumatized to a minimum.

Here again it is necessary to have a good radiogram and study it sufficiently so that the surgical procedure can be outlined in advance, although conduction anesthesia permits of much latitude in this instance. The field of operation is prepared as described previously and sterile gauze rolls or sponges are placed on the lingual under the tongue to take up the fluids. These are replaced as often as required. An incision is made through the mucoperiosteum about three-fourths of an inch long, extending posteriorly along the upper surface of the alveolar process covering the tooth, and close to the lingual. This incision is then carried buccally for about one-fourth of an inch. Another incision is now made in a vertical direction about one-eighth of an inch to the distal of the second molar and carried somewhat mesially to give room for approach with the chisel and elevator. This incision is carried down to a point about midway between the gingiva and the apex of the second molar. The reason for starting this vertical incision one-eighth of an inch to the distal of the second molar is to protect the gingiva of this tooth, although if the impaction be bearing hard against the distal root of the second molar and be lying horizontally it might be best to start the vertical incision at about the posterior third of the second molar. This flap is then lifted from the osseous tissue below with a periosteal elevator or a chisel. At this time the process covering the impaction on its upper surface is removed with a chisel and mallet to a sufficient extent distally to permit the removal of the tooth later, say about five-eighths of an inch. The process on the buccal side of the impacted tooth is next chiseled away freely enough so that the tooth will not bind at this point while prying it up later with an elevator and be forced against the lingual plate and perhaps fracture it. It may be necessary now to cut away some of the process in a tapering fashion toward the apex of the impacted tooth, thus giving all the space needed to partially right same. All the cutting of process is done on the upper surface and on the buccal and absolutely none on the lingual, as the lingual artery and nerve might be injured. In addition to this the patient will be very grateful if the lingual tissues are not disturbed at all. An elevator is now used cautiously at several points to loosen the tooth which after this preparation should be simple. If the process has been thoroughly removed as described there should be no difficulty now in prying the tooth upward and backward out of its socket completing the extraction. Any resistance to removal offered by the tooth at this point indicates simply that the bony impingements have not been sufficiently relieved.

POSTOPERATIVE TREATMENT

The wound is now carefully examined and all spicula of bone removed from the socket and all rough edges smoothed down. The amount of post-

operative treatment will depend almost entirely upon how neatly the work was done and how much the tissues were traumatized. A warm saline solution or a mild nonirritating antiseptic solution is used to irrigate the wound and socket. The flap is now sutured back in position after a blood clot has been induced. No gauze dressings are used unless there has been a suppurative condition and it is desired to keep the wound open. The patient is instructed to use warm saline solutions for a mouth wash and to look after the elimination. Rest is also very beneficial after an operation of this sort. For post-operative pain the writer has used a combination of aspirin, codeine and caffeine with good results. Aspirin in five or ten grain doses or pyramidon in five grain doses have also given satisfaction. To reduce pain by dressing the wound itself the writer has had best results from the use of novesthene and procaine in solution with some essential oils. A piece of one-half inch ribbon gauze is saturated with this solution and placed in the socket with the most gratifying relief. If preferred, iodoform gauze might be used. Recently the use of analine dyes as disinfectants and tissue stimulants have become somewhat popular. Crystal violet and brilliant green 1 per cent in 50 per cent alcohol is used. Some operators speak very highly of the efficiency of these dyes. As mentioned before, if the operation has been performed with correct technic and in a proper surgical manner, little postoperative treatment will be needed, but if the reverse be true disastrous results may readily follow.

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DEPARTMENT OF DENTAL AND ORAL RADIOGRAPHY

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A RADIOGRAPHIC STUDY OF BONE REGENERATION FOLLOWING APICOECTOMY

BY MARTIN DEWEY, D.D.S., M.D., NEW YORK CITY

THE problem of pulpless teeth has been one that has occupied the attention of the dental and medical profession during the last few years, and a large number of operations and technical plans for treating pulpless teeth have been devised by different men. To a certain extent one might divide these various plans of treatment into what can be termed therapeutical and surgical.

Under the head of therapeutical methods, would be included various plans of medication which have for their object the treatment of the pathological condition at the end of the root whereby the tissues are placed in such a state that Nature is able to change a pathological condition to one that is physiological.

It must also be remembered in this classification that surgical means enter into the therapeutical as far as actual treatment of the pulp canal and its filling is concerned. Under the surgical means we may include such methods as recognize a pathological condition at the end of the root and take the viewpoint that the quickest way to eradicate pathological tissue is removal by surgical methods, allowing Nature to heal or regenerate new tissue after the surgical operation.

The surgical method has many advantages because it is founded upon sane and safe principles which include the removal of all infectious conditions when known to exist. The surgical operation may be apicoectomy, which includes the removal of a portion of the apex of the tooth, or it may, in some instances, consist of simply a removal of the necrotic and pathological bone around the end of the root, leaving the end of the tooth intact. Of course in the surgical treatment of infected areas at the apex of teeth the pulp canal must be surgically clean and filled.

The surgical removal of infected material at the end of the root also including the actual removal of a portion of the root is an operation upon the value of which the dental profession is divided. Men who have developed

a fine therapeutic plan of treating pulpless teeth are opposed to anything that resembles surgery. A man who is surgically inclined is also liable to place too much weight upon operative treatment of infected areas. Nevertheless, if both plans are given their proper and due consideration, I believe in the majority of cases, where the infection is to any degree extensive, that the surgical procedure offers the patient more relief and more hope of permanent relief than does the therapeutic method. The surgical method is more logical.

I make this statement realizing that men claim the surgical treatment of infected areas at the end of the teeth is out of "date" and as some say, out of "fashion." Nevertheless, surgical principles still exist in the treatment of pathological conditions.

The other day in conversation with an exodontist, I said that I had seen many excellent results in the surgical treatment of infected apical areas. The exodontist replied, "Yes, and I have extracted many of those 'excellent' results." He made the statement as if the fact that he had extracted teeth upon which apicoectomy had been performed, condemned the operation as a failure. Such an argument is not logical because the undertaker eventually buries every patient who has had a surgical operation. In fact the undertaker also buries the people that have never had surgical operations. Likewise one might say that surgery was a failure because the patient eventually died even though he may have died thirty or forty years after the operation, from an entirely different disease.

Many of these teeth upon which apicoectomy is performed are eventually extracted because of other pathological conditions; because they are finally extracted does not mean the apicoectomy was a failure. Exodontists extract teeth which have also been treated by therapeutic measures; they also extract teeth that have had no treatment whatsoever. In fact, the future of most teeth is that they will be extracted provided the patient lives long enough. So for any one to say that apicoectomy is a failure because the tooth has been extracted is drawing a conclusion which is by no means logical and which is entirely unfair to the operation, and if such comparison is going to be taken as a basis we might as well say that all dental operations are failures, even to the filling of the cavities because teeth that have cavities filled and have vital pulps are often extracted some time in the life of the individual.

The surgical treatment of infected areas at the end of pulpless teeth is in keeping with the knowledge of modern surgery and pathology and is a much safer method of treating many of these conditions than is the therapeutic method in attempting to eliminate all of the infection through the small opening of the pulp canal.

There is another question in regard to the surgical treatment of infected areas including apicoectomy which has received much discussion; that is the regeneration of bone in the surgically treated area. I can remember a few years ago when a number of men insisted that the bone never regenerated in those regions. It seems to me that such a statement as that was

only the result of ignorance in regard to physiological development and growth of bone.

In any region of the body where there is a healthy bony surface that is not in contact with soft tissue, the bone will regenerate and fill that space. Experiments in the development of bone carried on by investigators prove that healthy bone will regenerate provided activity is not limited by pressure.

After the radiogram became more common and it was possible to make radiographic studies, it was clearly demonstrated that osseous tissue filled in these spaces from which necrotic tissue had been removed. Then we find a new word crept into dental nomenclature and men spoke of this new bone as being "sclerotic." From a histological standpoint it is rather a difficult thing to define "sclerotic bone" but we presume that the men who originated that term mean that this bone is "scar bone" as distinguished from normal bone.

I have never known of a clear and scientific definition of sclerotic bone based upon histological characteristics. Sclerotic bone is nothing more than compact bone which is the first type of bone to form in regeneration or bone repair. This bone which forms at the apex of a tooth after a surgical operation is exactly the same type of bone that would develop on the body of the long bones if the periosteum was lifted away from the body of the bone and a space was allowed to exist between the shaft of the bone and the periosteum. This nodule of bone which would form under the periosteum would have the same histological characteristics as the bone that developed at the end of the tooth after apicoectomy, and the x-ray would picture it as being denser and more compact and practically devoid of cancellous structure. The circulation and nutrition would consist of what could travel into the bone through the canaliculus of the bone cell. In other words this nodule of newly formed bone is practically devoid of cancellous formation and medullary spaces which means no capillaries or circulation exist in it at that time.

This new compact bone is the result of bone cells being thrown into the space from the pre-existing bone and consequently they form a more dense bone than that which has existed a longer period of time and has been absorbed and rebuilt so as to produce the cancellous and medullary forms. The bone which forms at the end of a tooth after a surgical treatment of infection is the same as the new bone that forms at the fractured portions of the long bone and can be easily understood if one has devoted time to the study of a large number of histological sections showing the growth and development of bone in the embryo and bone of various ages and the different manner in which it stains in histological preparations.

It must also be remembered that the very life of all bone consists of constant rebuilding and absorbing in all parts of the body. Bone recently rebuilt is compact bone and shows the same appearance as the so-called "sclerotic" bone. After we have considered this early form of bone in the surgically treated areas which is always dense, it is well to study the further change in this structure. If a series of these cases were studied it would eventually be found that this compact bone disappears and is replaced by cancellous bone

which has the same appearance as the rest of the alveolar structure. Of course it takes some time for these changes to occur because it takes a considerable period of time for a bone which has been fractured to develop to the point that the line of fracture is not discernible in the radiogram or histological section.

It is rather surprising to some of our friends who are opposed to surgical treatment of pulpless teeth to know the rapidity with which this new bone regenerates and assumes a normal physiological appearance as portrayed by the radiogram.

The following three cases show some interesting features in bone development following apicoectomy. It is needless to go into the various technics



Fig. 1-A.—December 15, 1920.



Fig. 1-B.—December 15, 1920.

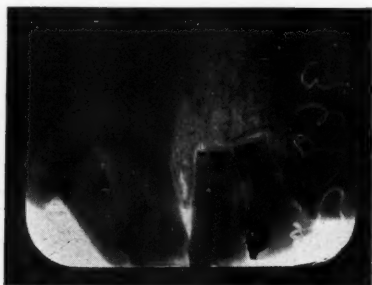


Fig. 1-C.—October 31, 1921.

employed in treating these cases, for I am only analyzing the histological significance of the radiograms as shown in three cases.

Fig. 1 shows a case which on December 15, 1920, presented with pulpless teeth with a considerable infected area at the end of the root. The second picture (*B*) shows the case immediately after operation. It will be seen that a considerable portion of the bone has been removed and that the ends of the roots have been cut off. Fig. 1-C, which radiogram was made October 31, shows the bone as regenerated, and it has already assumed a cancellous appearance. If a radiogram of this case had been made four or five weeks after the operation, we would have found that the area from which the necrotic bone had been removed, was filled with a much denser bone than we find on October 31, 1921.

Fig. 1-C shows a condition at the end of the root in which a space seems

to exist between the end of the root of the bone. The future of this space is a matter of more or less discussion, but I do not believe it has any pathological significance and only exists because of the fact that the Human Family has evolved to a point where bone and dentine do not unite the same as they do in some of the lower animals. I believe in many of these conditions there will be a regeneration of cementum over the end of the root from the gradual creeping up of the cemental organ the same as the bark grows over a tree where a portion has been removed.

I saw a histological section in the possession of Dr. Hecker a few years



Fig. 2-A.—March 26, 1920.



Fig. 2-B.—March 26, 1920.



Fig. 2-C.—October 15, 1920.

ago which showed an accidental fracture of the end of a root, the same possibly unknown to the patient, in which the cementum had grown over the tooth and root portion which remained in the tissue. How long this fracture existed no one knew, because the specimen was obtained from the dissecting room and no previous clinical history could be obtained, but it proved conclusively that the cementum was a constantly growing tissue which if in a pathological condition would cover dentine such as the end of the root where the dentine has been exposed as a result of the apicoectomy.

Fig. 2 also shows three views. The pictures *A* and *B* are before and after

the operation. *C* shows the case on October 15, 1920, in which the bone has regenerated and assumed a decided cancellous appearance and which has every indication of being a perfectly physiological bone.

Fig. 3 is also another case in which the first two pictures *A* and *B* are made immediately before and after the operation. Fig. *C* was made on November 17 and shows a regeneration of bone which so far as density and cancellous arrangement is concerned, is normal. The socket of the tooth is also climbing over the edge of the root which would indicate that the cementum is gradually developing around the apex of that tooth and will eventually cover the exposed dentine completely and with the regeneration of a new peridental membrane you will have the same appearance at the end of that tooth that we find in some patients where the roots of the teeth are short and undoubtedly have failed to develop to the proper length. In some instances the bone unquestionably has been absorbed and followed by the regeneration of the cementum and the peridental membrane of that area.



Fig. 3-A.—April 23, 1920.



Fig. 3-B.—April 23, 1920.



Fig. 3-C.—November 17, 1920.

In speaking of the absorption of the teeth, why this absorption occurs in the permanent teeth we do not know, but it does occur normally in the deciduous teeth and we find a portion of the root may be absorbed and the cementum and dentine removed to a certain depth and later the cementum will be entirely developed over the dentine in that region. Such conditions as that were shown by Dr. Black by his work on the peridental membrane. Specimens made by other men showed the same condition. The radiogram interpreted in the light of modern histology reveals the same in the permanent teeth. I think this absorption in some instances may be produced by improper orthodontic treatment and in other cases it occurs for unknown reasons at the present time. Viewed, then, in the light of modern histology and in keeping with a knowledge of bone development, everything indicates that the surgical treatment of infection at the end of the teeth is perfectly logical and holds out a great degree of success.

The bone regenerated after surgical operations will show different radiographic appearances depending upon the length of time after the operation that the radiogram is made. Also these various changes in new bone area are the same as would occur in normally developed bone in any part of the body. It is our opinion that the so-called "sclerotic" bone is only a compact bone that always develops in any part of the body where the bone cells develop in great numbers as they do in the space created by surgical treatment of the infected area at the end of the teeth.

TECHNIC FOR DENTAL RADIOGRAMS WITH INTRABUCCAL FILMS*

BY NADAUD (OF COLMAS)

THE surgeons and dentists in France seem to avail themselves less and less of the valuable and indispensable information which the systematic use of the x-ray might furnish them. The radiographic examination of the pathology of the teeth and maxillae is divided into the three following radiographic methods, which is far from being an objection, as each have their advantages.

1st. External method, with the extraoral plate and projecting on this plate each side of the maxillae, separately.

2nd. Internal method or intrabuccal, originally described by Costa and Sinclair, perfected and named "the method of horizontal projection by Dr. J. Belot."

3rd. Internal, intrabuccal method by direct projecting on the films.

In this article, we have especially in view the use of this latest method which several of our scholars, such as Jaugeas and Albert-Weil, it seems to us, have either discredited wrongly or have presented as very complicated. Our purpose here will be to determine the characteristics of a simple and convenient technic which, without any special appliance, will always furnish us with excellent results and which others, with a few differences, have used with certainty before us.

TECHNIC

We use x-ray films with a double-emulsion, the films being cut to the desired size in the dark-room. The sizes we use are 2 cm. by 3 cm. for taking an individual tooth and 4 cm. by 5 cm. for taking several teeth at a time (general size 3 or 4 cm.).

1. *Packing.*—Each film, as when utilized, is carefully packed in a small rectangular sheet of black opaque paper which is folded two or three times over the film and whose slightly overlapping borders are turned back of the film once it is folded. The entire thing is again enveloped in a new rectangle of

*Translated by Margaret Gortikor, D.D.S., from *Jour. de Radiologie et d'électrologie*, November, 1921.

very thin parchment paper whose overlapping borders are folded like those of the black paper in order to protect the film from contact with the saliva.

2. *Placing It in Position.*—The patient who is seated on a chair with a high vertical back opens his mouth wide and the operator places the film, thus prepared, against the lingual surface of the tooth or teeth involved and against the corresponding part of the maxilla. He then holds this film with his right forefinger if on the right side of the mouth (whether upper or lower maxilla) or with his left index finger if on the left side. With the hand that remains free, he so adjusts the film that one of the sides measuring 2 cm. if it is for an individual tooth, or if it is for several teeth, then one of the 4 cm. sides should be on a level or pass slightly beyond the occlusal border of the crown or crowns of the tooth or teeth involved. Then it follows that the long axis of the tooth will be parallel to the 3 cm. border of the film. This done, the operator places the thumb of the patient in the place of his forefinger (right thumb of the patient for the left side, left thumb of patient for the right side). It is advised that after the substitution of fingers under control of the operator, the entire width of the cushion of the thumb be passed over the film, pressing it firmly over the teeth and the maxilla at the same time. At the time of substitution, no difficulty will be occasioned if the operator takes pains beforehand of explaining to the patient what is expected of him. The operator can accurately demonstrate on himself, using a blank. If during the course of substitution the film has become slightly displaced, it is right for the operator to gently replace the latter in position. It being easy to exert pressure, the film is held firmly against the teeth and maxilla under these conditions.

Thus it is not necessary to use the special film carried or the buccal stamper made of solidified dental wax for holding the film, both articles being mentioned by Albert Weil in his book. In our opinion there is a useless complication without any advantage involved in the use of such articles.

The little "trick" which we have indicated, requires much more time to describe than to execute especially when you are in the habit of doing it.

3. *Direction of the Normal Ray.*—It is indispensable that we provide ourselves with a gauge of the exact incidence which is easily removed and becomes very much mixed up with the normal ray of the x-ray tube previously well centered.

(a) *Upper Maxilla.*—The patient, as we have stated above, is seated, head erect, leaning against the back of the chair, and made stationary by crossing over the forehead a band of cloth whose fag-ends, thrown backward, each supports a weight of about 1 kilogram. You incline the head in the direction of the sagittal plane so that the line which joins the labial tubercle to the tip of the lobe of the ear be approximately horizontal.

The normal ray of the x-ray tube is at an angle of about 35 to 40 degrees and meets the cheek of the patient approximately at the line which joins the upper part of the alae of the nose to the upper part of the tragus (Fig. 1). A point that we should recall is that the upper second molar is almost as high up as the inferior angle of the molar bone and that the canine generally is as

high as the labial commissure. The first inclination of the head having been made, the normal ray is directed in a vertical plane, almost perpendicular to the maxilla at the central point of the area to be radiographed.

The points we have just indicated do not require absolute accuracy; after a little practice, you can quickly get to establish these conditions with sufficient exactness by just a glance of the eye, that is, provided your apparatus is easily managed.

(b) *Inferior Maxilla*.—The patient is disposed of in the same manner as for the upper maxilla but, in this case, the normal ray besides being horizontal is likewise located in a vertical plane which is perpendicular to the direction of the maxilla from the point being considered. The ray will meet the cheek in a point located in a line parallel to the one which joins the labial tubercle to the tip of the ear-lobe and being about a finger-breadth distance beneath it.

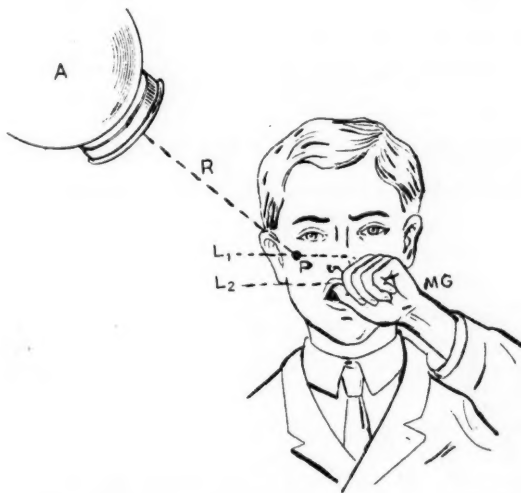


Fig. 1.

Fig. 1.—Taken of the upper teeth on the right side of the mouth. The patient places his left thumb in his mouth and holds the applied film.

A, X-ray tube. R, Direction of the normal ray. L₁, Line passing through upper part of the alae of the nose and the upper part of the tragus. L₂, Line passing tubercle of the lip and the tip of the lobe of the ear. P, Point where the normal ray meets the line L. M.G., Left hand holding the film.

4. *Taking of the Negative*.—With the outfit that we have (Coolidge Standard) we work with 48,000 volts, with 15 milliamperes and the focus-plate at a distance of 60 cm.; our time of exposure is 1½ to 2 seconds for the anterior teeth and the teeth of the lower maxilla and an exposure of 3 to 4 seconds posterior teeth of the upper maxilla.

RESULTS

The negatives obtained by this method, especially those which apply to the radicular and periradicular regions, are very detailed and so good that in our opinion it seems to us these qualities cannot be attained by the two other methods. This becomes apparent when we realize how closely the film is brought to the tooth and root.

Before concluding we would like to refute some of the criticisms on the use of films, which Jaugeas mentions in his book. Speaking on this subject, he says "The adoption of the sensitive and flexible films to the posterior part

of the dental arches offers many difficulties and besides this method does not permit for the taking of the entire maxilla and does not always picture the tooth with its entire root.

1. We have previously shown with what simplicity, no special outfit being required, one can conveniently and in an unalterable manner adapt the sensitive surface to the posterior part of the dental arches. We will not insist upon it however.

2. Without seeking to oppose, as Jaugeaus does, the two methods mentioned at the beginning of this article, like the author, we also admit that the first two methods allow for the x-raying of a larger area of one-half of the maxilla, at one time. This is one of the principal advantages of these two methods. Furthermore, let us add that Dr. Belots' method provided with its special apparatus is easy to carry, quick and automatic so to speak.

The method we have described has no less of an advantage, being particularly indicated when we wish to x-ray with the best result, a limited region of the maxilla comprising one, two, or three teeth surrounded by their periradicular zones.

Besides, let us say that the use of the intraoral film in general allows for conveniently "tracing" the wisdom tooth, especially if we use a slight

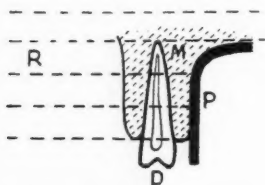


Fig. 2.—Superior maxilla with the horizontal rays, the apical region being focused, proceeding from the film. R, rays; M, maxilla; D, tooth; P, film.

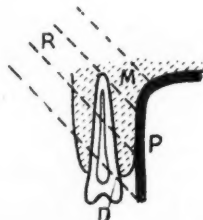


Fig. 3.—Upper maxilla with the rays at an angle of 40°, the apical region is completely focused on the film. R, rays; M, maxilla; D, tooth; P, film.

local anesthetic on the lateral portion of the palate for the upper teeth when you have a very nervous patient. Then nothing prevents your taking several radiograms of different limited areas of the same maxilla.

3. By the technic previously described, you always take in the apex of the teeth in the inferior maxilla and from there, the lower border of the film can easily be made to reach to the level of the inferior border of the maxilla if you depress the buccal tissues sufficiently.

The same applies to the upper maxilla because the inclination of the ray at an angle of 35 degrees allows for very easily including the apex of the teeth and the surrounding area. Figs. 2 and 3 will elucidate more clearly than any explanation.

Finally, let us say that this method, no more than the others, does not give the exact size of the roots, and besides, it offers but a mediocre share when it comes to the information generally required by dentists or the stomatologists from the x-ray.

CONCLUSION

It seems to me that the three methods mentioned at the start of this article are not to be compared and that, according to the case to be radiographed we ought to give preference to one method or the other or even use all three simultaneously.

The intraoral plate, placed in the dental arches with the ray at an angle of 45 degrees and the extraoral plate with focusing by dividing the maxilla into two parts, are indicated when we wish to have an idea of the "whole" and a detailed description of the serious lesions which spread and involve the teeth and the maxillae; but if we desire the precise and clear details concerning hidden and limited lesions radicular and periradicular, we ought by all means to direct our attention to the process of intrabuccal films.

RADIODONTIC RIDDLES

Conducted by Clarence O. Simpson, M.D., D.D.S.

**A Department Devoted to Discussion of the Scientific, Technical, and Ethical Problems
of Radiodontia**

Eyes, but We See Not

Q.—If the x-ray does not lie, what is your explanation for this instance? In this case there was a discharging sinus directly over the second premolar, which was sore and showed an absorbed root in the picture. I opened the tooth and found a vital pulp, which I removed. I then noticed a slight rarefaction around the mesio-buccal root of the first molar, and after failing to get through the canal, extracted the tooth. The sinus continued to discharge, so I opened the first premolar on suspicion and found the cause of the trouble. Is this experience not enough to destroy my confidence in the x-ray?



Fig. 1.

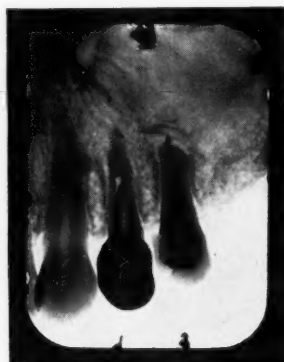


Fig. 2.

A.—No, this experience might destroy your self-confidence or the patient's confidence in your ability, but it should strengthen every one's confidence in the truth of x-ray evidence. The error was in the interpretation and application, not the evidence. You made so many mistakes that they must be reviewed in order.

First. Your radiographic examination was inadequate and technically imperfect. If you had projected the structures accurately upon the films or even made more "blind shots," you probably would have observed conditions around the first premolar. Is it economy of films which leads men to limit radiographic examinations to one or two distorted negatives? It cannot be economy of time, for a thorough examination is the greatest time saver in any treatment.

Second. A marked periapical destruction around the first premolar is

evident from the films submitted. Doubtless, you were looking for a round black spot, labeled "abscess." The discharging sinus should have forewarned you that probably there was not a typical "granuloma" present, because of the drainage. If you had carefully studied the films, you would have seen the obliteration of the lamina dura around the apical third, and an apparent necrosis of the root end.

Third. You should have attempted to trace the course of the sinus before making a diagnosis, the best method being to gently insert a gutta-percha probe, allowing it to follow the direction of least resistance until obstructed.

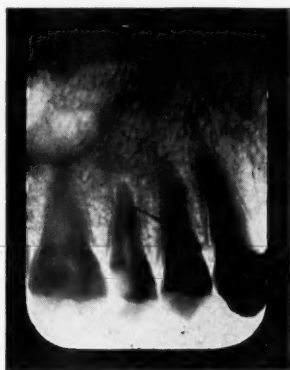


Fig. 3.

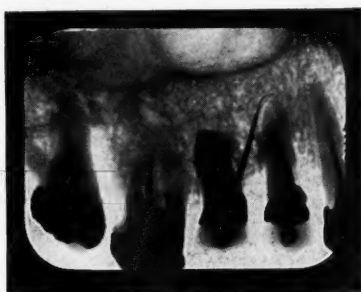


Fig. 4.



Fig. 5.

Figs. 3, 4, and 5.—The application of a gutta-percha probe to ascertain the course and origin of fistulous tracts.

If the probe passes sufficiently far to reach the alveolar process, and the course is not influenced by the opinion of the operator, it may be depended upon to serve as an indicator pointing at the guilty tooth in subsequent radiograms. (Figs. 3, 4, and 5 illustrate the application of this method.)

Fourth. The second premolar should not have been opened without a vitality test. In the absence of special appliances for pulp testing, a hot bur-nisher or a piece of ice would likely have given a conclusive response. Pulp testing is not an exact science, but it is an invaluable adjunct to diagnostic methods. The recent text book on the subject by that keen analyst, Dr. Howard R. Raper, should be assimilated by every dentist. When dentists seek information from professional authorities instead of "inhaling the bunkum"

of instrument demonstrators and nostrum vendors, there will be a decisive advance in the general standard of practice.

Fifth. You should not assume that an abnormally short root or large apical foramen denotes absorption. It may be the result of arrested development in teeth with vital pulps. A sufficient number of such cases have been observed to suggest caution in concluding that all unusual roots of pulpless teeth are necrotic. (Figs. 6, 7, and 8 illustrate incomplete root formation in vital teeth of adults.)

Sixth. There is no evidence of infection from the mesio-buccal root of the first molar in the negative submitted, and beware of ill defined shadows around the buccal roots of maxillary first molars. Probably because of the thin buccal plate in this region, there is commonly an area of lessened density

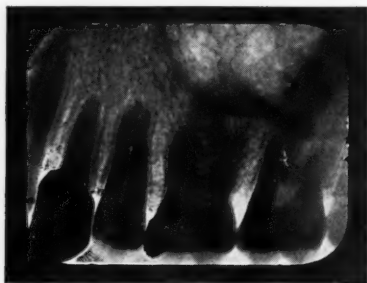


Fig. 6.



Fig. 7.



Fig. 8

Figs. 6, 7, and 8.—Incomplete root formation of vital teeth in adults.

around these roots, and special care must be exercised to differentiate between the normal radiolucence and the results of disease.

The course of a fistulous tract, seldom can be seen in radiographic records, but apparently you have demonstrated one in this case. It can be traced from the apex of the first premolar to a point opposite the second, where the opening was located. This would account for the suspicious area which appeared to be over the second premolar, and perhaps it could have been shown radiographically to be some distance from the tooth.

This case should have been only an interesting problem in radiodontic technic and diagnosis, instead of humiliating mistakes resulting in the loss of a tooth, a pulp, and some confidence. The canal operation in the second premolar indicates that you are a skillful operator. The diagnostic chart enclosed with your letter shows you are studious and have an exceptionally

broad conception of dental practice. You are alert and progressive, because you have had radiographic equipment for several years, but the partial service which it gives you is lamentable. In this connection, you are not to be individually criticized; it is the general status of radiodontia, the most neglected phase of dentistry.

The chief interest of dentists in radiography is which machine to buy. After deciding this momentous question on superficial ground, they learn the manipulation of the switches from the salesman, and awaken the following morning expert radiodiagnosticians. Conceit and indifference prevent rapid improvement in this condition. When a dentist installs an automatic apparatus and finds he can "take an x-ray" (whatever that is) by pointing it at a patient and pulling the trigger, his egotism scorns additional knowledge. A purpose of this department is to plead the necessity for serious study of radiodontia. The suggestions are not offered in the guise of a master, but as an earnest student with appreciation of the difficulties encountered and some of the undeveloped possibilities.

Fertile Fields Await

Q.—Is it advisable for me to specialize in dental radiography in a town of 75,000 inhabitants? Several other dentists have machines and there are two x-ray laboratories run by physicians.

A.—There should be competent radiodontists in every city, but whether or not it is advisable for you to limit your practice to radiodontia depends upon your qualifications.

Radiodontia as a specialty is comparatively undeveloped, and abundant opportunities await men with the ability and initiative to grasp them. Oral radiography is probably not used in 5 per cent of the rational indications for it. The demand for the more skillful and general application of radiography in oral diagnosis is steadily increasing, but at least a decade will elapse before the application will approximate the indications. A general radiodontic examination is indicated annually for each individual from the age of eight until all the teeth are lost and the edentulous process is normal. Dentists correctly advise a clinical examination semi-annually. Why a partial investigation when the means of a thorough one are available? Proximal caries are disclosed by x-ray examination long before it can be discovered by other methods; why wait for the explorer, with dentin and possibly pulp infection? Marginal disturbance usually can be diagnosed earlier by bone changes than gingival manifestations; why procrastinate with a destructive process, if pyorrhea alveolaris is to be prevented instead of "prolonged"? Marked periapical alterations occur within six months. Why depend upon improbable subjective symptoms when chronicity is so important in prognosis?

Special radiodontic examinations are indicated in orthodontic treatment, extraction of teeth, pulp canal operations, traumatic injuries, etc. Practicing any branch of dentistry without the assistance of radiography may be compared to a dentist with a $\frac{20}{100}$ vision trying to operate without lenses to correct the deficiency. He may deceive his patients and overcome the handicap

to some degree, but he could facilitate his work and render better service with unimpaired vision.

With this field in prospect and awaiting development, radiodontia is greatly undermanned. Your city needs radiodontists. If you enter the practice with a realization of the responsibilities, the requisite technical knowledge, and professional integrity, you will succeed. Other dentists who have radiographic equipment need not be considered in your decision. They will help to popularize radiography, but the usual mediocre results of men in general practice will offer no competition. The laboratories conducted by physicians will retain only the patronage of some physicians who value professional friendship more than professional service, and some dentists who have neither the honesty nor courage to expose their operations to another dentist. Humanitarian service calls; professional evolution is auspicious; introspection alone must decide the issue for you.

ABSTRACT OF CURRENT LITERATURE

Covering Such Subjects as

ORTHODONTIA — ORAL SURGERY — SURGICAL ORTHODONTIA — DENTAL RADIOGRAPHY

It is the purpose of this JOURNAL to review so far as possible the most important literature as it appears in English and Foreign periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the publishers.

Dental Disease as Related to Systemic Disease. C. J. Grieves (Baltimore).
The Dental Cosmos, December, 1921, lxiii, 12.

This subject enables us to group dental diseases along special lines. In one class we see the results of local injury and bad dentistry, in another the oral manifestations of general states as pregnancy, diabetes and metallic poisoning, and in a third conditions which may be both local and systemic at the same time, as lues and other general infections. All of these affections may cause alterations in the mouth which may later serve for focal infection—breaches of continuity which may form the nidus for an infectious process. Considering the theoretical possibilities focal infection may be regarded as rather rare in proportion to the number of ports of entry. The teeth may be the source of other anomalies due to reflex irritation (as nervousness, migraine, referred pain), to secondary deformities of the nasal chambers, to malignant disease from irritation of the mucosæ by the teeth, etc. Focal systemic disease is eminently a chronic process which differs radically from acute sepsis originating in the mouth.

The author proceeds to a study of apical and gingival atria which present a sharp contrast from the standpoint of treatment. In the former the tendency is to extract and in the latter to conserve the teeth. Something seems radically wrong here and the two problems should be harmonized as far as possible. It has been shown for example that teeth which are apparently only gingivally diseased harbor pathogenic organisms in 50 per cent of the cases. This should convince us that the mere presence of germ life in a tooth does not constitute disease. So-called latent infection is not in itself a *motif* for extraction. To reckon that such foci must sooner or later abscess is to go against all experience. But certain exceptions must be made as in the case of bicuspids and molars lying in or near the antrum floor, in which the radiogram is unfavorable. Here a sound apex may not justify retaining the teeth.

Such cases do not affect the fact that as a rule apparently healthy, well filled pulpless teeth may be retained despite latent microbism. The author however disputes the accuracy of the claim that granulomata are harmless formations which contain only a few nonvirulent streptococci. Mixed infec-

tion is common and the cell reactions are often toxic. We certainly cannot guarantee that these foci will always be harmless. The author appears to draw the line on teeth with actually infected apices, which he regards as candidates for extraction. This is very different from wholesale and promiscuous extraction and curetting. He in this connection imputes to the discovery of local anesthesia the possibility of doing an infinite amount of mischief by semi-educated dentists.

A Plea for Surgical Exodontia. L. W. Silverman (Syracuse). *The Dental Cosmos*, November, 1921, lxiii, 11.

Surgical exodontia dates from the discovery of dental focal infection. It necessitates on the part of the dentist an increased study of anatomy, special positions of the chair and operator, surgical sterilization and an operative technic. Under the head of anatomy the x-ray will supply most of the information although the dentist should be conversant with the anomalies of roots, the relation of the latter to the antrum, etc. The patient has a marked fear of the surgical extraction which he seems to associate with the afterpain of bungling ordinary extraction. In some cases bromural is given to overcome the nervousness. In extraction of maxillary teeth patient should be placed in the almost supine position with head thrown far back; in mandibular extraction the occlusal plane should be almost horizontal. The operator should always stand with the tooth in full view. From the standpoint of extraction the author makes seven classes of teeth. We may only note what he says of the last class comprising the wisdom teeth. Here extraction is often difficult as in case of large size with bifurcated and distally curved roots. As a rule the elevator and forceps should both be used if the second molar is intact. If granulomata are already present as shown by the radiogram it may be necessary to operate after the tooth has already been pulled without subsequent curettage. In all such cases after extraction the gum and periosteum should be incised and the flaps held out of the way (provided of course that the alveolus cannot be curetted through the socket). The alveolar plate is then chiselled away. If a root is present it should be extracted, after which the cavity can be curetted. The radical surgical exodontia is required in the case of impacted teeth although these particular teeth are not infected teeth at all.

The Tenth Case. Herbert McConathy (Miami). *The Dental Cosmos*, November, 1921, lxiii, 11.

The author refers to the belief that one dental case in ten is foredoomed to be unsatisfactory to the patient because of some complication like necrosis of the bone, infected antrum, need of root amputation, etc. The dentist may at least be able to anticipate these troubles and in part discount them by making routine blood examinations. If the blood is affected this in turn is only a symptom and one must seek its cause. Every dentist should cooperate with a good internist, who must be both able and willing to assist him. But he hesitates to take this step for fear of alienating other practitioners. There are other reasons why the dentist does not wish to call in a medical man; one

is that it makes him appear to sidestep responsibility. This viewpoint, however, is probably unsound. It may be possible to refer the patient back to his family physician but the better course will doubtless be to send him to the internist who is known to avail himself of all laboratory resources. The whole thing is often a matter of diplomacy, for should anything go wrong the patient will have had the best local opinion, the dentist's responsibility being cut in two.

Influence of the Teeth on the Clinical Evolution of Fractures of the Maxillae.

Cavina (Bologna). *La Stomatologia*, January, 1921.

The author concludes his long study of the above subject as follows: It has been shown that teeth interposed between the fragments of a fracture, or very near its focus, may be the cause of slow union, false joint and bone fistulæ. In all three cases the mechanism is essentially an osteitis of the fragments provoked by a primary periodontitis, or, more frequently, by a secondary periodontitis due to degeneration or necrosis of the pulp and of traumatic origin. Less infrequently the delayed union and false joint are due to the persistence of dental roots wedged between the extremities of the fracture. This etiology being known one may prevent the consequences by a rational treatment as follows: teeth wedged between the fragments should without exception be at once extracted; teeth by the side of the traumatic focus should also be extracted if quite free in their sockets or very loose; dead teeth or those suspected of devitalization should undergo precocious extirpation of their pulp, if there are no periodontal complications; either extraction or attempt at conservation when there is inflammation of the dental ligament; avulsion in all cases from the time of appearance of purulent periodontitis, periostitis, or osteitis or when a fistula has formed. In all cases of retarded union, pseudarthrosis and fistula, the teeth should be carefully examined, including study of a good radiogram, and one should not hesitate a moment to follow the rules as above laid down.

The Crushing Power and Masticating Area of the Teeth. Iwao Ono (Kyoto).

The Dental Cosmos, December, 1921, lxiii, 12.

The sum of the masticating area and crushing power is equal in theory to the digestive capacity, and in one way the function of dentistry is to restore lost digestive capacity. The average crushing power is reckoned as nearly 30 lbs. per square inch and even for the toughest uncooked food articles a pressure of more than 100 lbs. to the square inch is seldom necessary. In order to obtain a further idea of mastication the author devised artificial jaws with porcelain teeth estimating the frequency of masticatory movements as 40 to the minute. It is possible to regulate the grinding stress from 10 to 200 lbs. to the square inch. Naturally only the premolars and molars enter into the computations. The total masticating area is not stated but appears to be something under 200 sq. cm. or more accurately about 11 square inches. Loss of the first molar reduces the entire crushing area one-fourth, but experiments

with digestive fluids and certain foodstuffs seem to show that the actual loss of digestive power is one-third. This difference can only be due to the superior importance of the first molar in mastication. For the subject with defective teeth, to offset their loss, his food must be softer or better cooked, and he must chew longer but, of course, his best hope is restoration of the grinding surface. In speaking of such restoration as possible by prosthesis and plate teeth the author ignores the statement of authors that the pressure of the latter is only a small fraction of that of natural sound teeth.

Traumatic Occlusion and Its Correction in the Treatment of Pyorrhoea Alveolaris. Tom Smith (Langton). *Journal of the National Dental Association*, December, 1921, viii, 12.

Whether this affection is a cause or effect of pyorrhea has been much debated, and the author believes that both sequences occur, which of course facilitates vicious circles. A few experts are in the habit of grinding down the high spots by carborundum but the general run of dentists are apt to overlook traumatic occlusion, or to grind at haphazard, which tends to ruin the occlusion altogether. Any condition which contributes to loss of function may be a factor in traumatic occlusion. The symptoms in addition to functional insufficiency are gingivitis, unmotivated calcareous deposits and fine, dark red lines on the gum tissue parallel to the roots, especially on the lower labial gum tissue—these being early evidences—with eventual loosening of the teeth, pocket formation in the alveolus and tenderness of the teeth on percussion. Functional disturbance involves the act of swallowing which is normally performed several hundred times daily. Unless there is perfect occlusion swallowing is imperfect and the normal suction exerted upon the teeth is almost lost. Loss of swallowing ability will also cause malocclusion and habitual swallowing is a factor of importance in drainage of the mouth, incidentally removing decomposing food particles. In discussion of this paper Bricker of Rochester, Minn., mentioned that he instructs all of his patients to swallow forcibly after the routine cleansing of the teeth.

Employment of X-ray Dosage in the Treatment of Pyorrhea. J. L. Garretson (Buffalo). *The Dental Cosmos*, November, 1921, lxiii, 11.

The author mentions the absence of pyorrhea in children and the negative result of inoculating healthy pockets with pyorrheic microorganisms. Apparently it is more a matter of unhealthy soil with low defensive powers than of the virulence of the organisms present. On the other hand the latter are not mere saprophytes. The condition may be likened to *acne vulgaris*, for the presence of the germs causes local disturbances. If this theory is correct pyorrhea should improve spontaneously as the condition of the tissues improves and this as a matter of fact does occur with the assistance of local treatment. Studies of a number of different observers appear to show that the x-rays do not sterilize the tissues, yet do cause improvement in the disease. The presumption is that in some manner the rays increase the resistance. This

result might come about in various ways as by causing absorption of infected tissues or by sealing up the lymphatics. Conditions here may be similar to those in infected tonsils which also benefit from radiation. The latter process can favorably affect tissues which are inaccessible to other methods. Serial sessions 10 or 15 days apart are advised if the dose corresponds to one skin unit. If the dose is smaller the interval may be reduced to 6 days. After three sessions of the latter type the dose may be increased to a skin unit every two weeks. Three or more exposures are in any case necessary to ray the entire face, using an aluminium filter to protect the skin. It is desirable that rayed areas do not overlap one another, and this may be avoided by using lampblack applied to the rim of a treatment cone. The author gives formulæ for dosage which comprise the ampèreage, length of spark gap, time exposure and thickness of filter.

Epilepsy Due to Unerupted and Impacted Molars. W. G. McGauley and F. H. McGauley (Boston). *The Dental Cosmos*, January, 1922, lxiv, 1.

A boy aged fifteen years had been an epileptic for two years and the attendant medical men knew of no determining causes. The family history was negative. On one occasion, during April, 1921, he seems to have fallen unconscious while at school, remaining in this state for three-quarters of an hour. There is no mention of a major crisis but a dull feeling in the left side of the face with a tremor of the jaws may have been an abortive attack of aura. Two days later there was a second similar attack, the sensory aura—if that is what it was—being referred to the left lower jaw. The physician suggested the extraction of the second molar tooth in that region but the dentist refused to pull it without a reason and the tooth was quite sound. Another dentist suggested an x-ray and the authors were asked to take charge of the case. The radiograph showed a partly developed and unerupted third molar in the left lower jaw. After a blood Wassermann proved negative the patient was placed under ether narcosis and the tooth in question removed by the indicated technic. During the next few days there was some twitching and trembling on the right side of the face and another radiogram showed an analogous condition of the right wisdom tooth of the lower jaw. A second operation was at once performed (April 23). When last seen, on July 15, the patient had had no further manifestations of epileptic or convulsive character.

Surgical Management of Serious Focal Infections. T. A. Hardgrove (Fond du Lac). *The Journal of the National Dental Association*, January, 1922, ix, 1.

In his summary the author insists that we should not forget that the subject often involves the alternative of life or death, and hence the dentists should shirk no possible responsibility from this angle. Serious cases of focal infection should from analogy with other serious illness be treated at the hospital, if for no other reason than for the sake of the accurate records made and preserved for future teaching values. Further, the likelihood of the most serious complications gives the patient an advantage if emergencies are to

arise. Thus in case of lowered blood tension and threatened cardiac collapse the patient is much better off within the hospital walls. If the patient chances to be a victim of some form of nephritis the possibility of serious complications involving the heart, respiration and brain, is great. In case the patient suffers only from uncomplicated heart disease with good compensation, there is, on the other hand, no special likelihood of severe complications and the advantages of hospital treatment are less pronounced.

It should not be forgotten that the main object in removing an infected tooth is not so much to get rid of the tooth as to make possible efficient drainage of the focus. Before operating the blood pressure should be taken and if the systolic and diastolic pressures nearly coincide operation may be contra-indicated even under local analgesia. There should be no routine opening of the antral cavity. In the case of a badly infected and firmly implanted third molar in a subject over 55, the obstructing second molar should be first extracted, otherwise there is considerable risk of fractured jaw. The author prefers novocain to apothecin as a local analgesic.

In the discussion which followed the delivery of the paper Dr. Truman Brophy stated that the speaker was evidently dealing with an especially severe type of focal infection. As regards extraction primarily for drainage Dr. Brophy believes that we may sometimes obtain good drainage without extraction. We certainly should aim at such an ideal. The words "abscess" and "infection" when applied to the teeth are often misnomers and hence confusing. Thus we have to infer the presence of pus and pent-up fluids, which themselves remain invisible. The dark shadow may mean only a past abscess in which absorption has taken place or even rupture; it may even appear in the total absence of infection, as after root treatment. Finally the infection, when one is present, may be limited to the bone, with soft parts intact. To make sure of an infection the external alveolar plate should be penetrated and a few drops of pus or escaping fluid examined; this resource can almost always be utilized. If nonpathogenic organisms alone are present no operation should be performed.

Dr. Rasmussen stated that the speaker had not mentioned the prognostic significance of a sharp postoperative rise of temperature. Personally he had found this a good prognostic in that it shows an active defense on the part of the organism. He would proceed very cautiously in a patient who did not thus react after extracting one or two infected teeth. Rasmussen cites cases in detail to illustrate his exact meaning. In closing Hardgrove added to the previous speaker's dictum that failure of the temperature rise after operation plus acceleration of the pulse pointed to a dangerous type of case.

A Case of Facial Fistula Due to Submaxillary Sialolithiasis. L. R. Kahn and J. Levy (New York). *American Journal of Surgery*, January, 1922, xxxvi, 1.

The great majority of facial fistulae originate in the teeth and the following case is of interest because it had a different source. The patient was a man of forty-one who four years earlier had noticed a swelling of the left

cheek. An x-ray appeared to show that the lower left second molar was at fault, but after its extraction the swelling persisted for a long time and after its disappearance certain swellings appeared in succession within the left buccal cavity and ended by the escape of fluid. Two years after the first symptoms a fistula formed on the outside of the left cheek. X-rays failed to throw light on its origin. The case at this period was very obscure and the history of the man suggested the possibility of an actinomyotic infection in early life and as a matter of fact the swelling subsided somewhat under potassium iodide. Puncture of the swollen area was invariably negative. In September, 1921, there was a renewed attack of swelling which involved the submaxillary and submental regions and the x-ray showed the presence of a calculus which after excision was found to have formed in the submaxillary duct. After this event the symptoms subsided spontaneously and the fistula healed. It was apparent that the molar tooth had been needlessly sacrificed. The calculus was $\frac{7}{8}$ inch in length and bore resemblance in size and shape to a canine tooth.

Is a Pulpless Tooth a Dead Tooth? R. W. Bunting (Ann Arbor). *Journal of the National Dental Association*, December, 1921, viii, 12.

This subject is the occasion of much debate and is not simplified by speaking of dead teeth as "devitalized" only. The real issue lies in the statement that a tooth is or is not a foreign body in the sense of something which should be removed, an irritating or harmful foreign body. Generally speaking harmless foreign bodies may become noxious but usually give rise to symptoms in becoming so. The author seeks an objective criterion of harmlessness and finds it in the intactness of the peridental membrane. With normal peridental membrane, in other words, the tooth is not technically dead. If this structure becomes injured or infected the status of the tooth becomes open to doubt, but in some cases of injury remarkable recoveries have been seen and the tooth thus injured cannot be officially condemned. The death of the cementum following the death of the peridental membrane is the factor which makes of the tooth root a true injurious foreign body but conservative dentistry can still render the tooth harmless even after the supervention of necrosis of both cementum and pericementum.

Why Some Pulpless Teeth are not Pathogenic. C. J. Grove (St. Paul). *Dental Items of Interest*, January, 1922, xliv, 1.

In the author's experience 25 per cent of all pulpless teeth are free from infection. There never has been a period in the evolution of the science of dentistry when the extraction of these teeth was indicated. He also takes issue with the teaching that pulp left in root canals invariably decomposes. This only happens when the quantity which remains behind is considerable; a little pulp becomes organized. Why then is not a large amount of pulp likewise organized. The pulp in the apex of the root apparently contains vital tissue which is not the case with the remainder. Whenever we find normal

periapical tissue about a pulpless tooth the possibility of subsequent infection is not to be taken into account. It is not even necessary or advisable to fill these roots. The conditions differ alike from those in which the mass of the pulp has decomposed and those in which the periapical tissues have become infected. The author takes issue with the majority of dentists when they claim that complete filling of root canals prevents periapical infection; in his own experience the exact opposite is the case, not indeed by right, but because of certain technical errors. There is much less infection when the root filling is less thorough. Once having assured ourselves that the roots are not infected, for reasons already explained, the proper course is to let them alone. If the fillings have been removed from such teeth he would not refill. In general the dentist when he removes pulp should not disturb that in the apex. Attempts to destroy the latter only too often cause periapical infection instead of preventing it.

Treatment of Toxic Anesthesia from Local Anesthetics. H. E. Tompkins (New York). *Dental Items of Interest*, January, 1922, xlv, 1.

In the course of an article on the toxicity of anesthetics and the prevention and cure of these accidents, the author sums up the management of a case as follows. The patient has fainted or is in collapse. The first thing to do is to send for the nearest physician, not because of any superior knowledge on his part, but out of policy. In case of failure to revive, the doctor has to share the responsibility and only a physician can sign the death certificate (at least in New York State). If death occurs without apparent sufficient provocation the condition known as status lymphaticus will commonly be present. The first actual step to take will be the injection of 1 c.c. of pituitrin, if practicable into a vein, otherwise intramuscularly. Should there be whiskey at hand, a glass should be poured out but not for the unconscious patient; for the dentist will doubtless be in such an unfortunate mental and physical state that he will benefit by its use. The patient has of course been laid flat on a couch or on the floor. The clothing is now opened and the sphincter ani dilated, using some force. Thus far not over one minute should have elapsed. If the subject has not rallied, artificial respiration should be begun while at the same time ammonia is held to the nose. Coughing or choking is a good omen of recovery. If there is no response to ammonia, ether may be substituted without fear of adding to the damage. In the meantime if there is a pulmotor at the gas company's offices or elsewhere it should be sent for and manual respiration kept up until it arrives. Heart massage may be added but in the author's opinion it often makes matters worse. Strychnia, caffeine and other analeptics are of no value whatever, until the victim is out of danger. The chance is that if he is alive after the first five minutes he will recover.

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EDITORIALS

Qualifications for Membership in the National Dental Association and State and Local Societies*

SEVERAL years ago when the National Dental Association was organized, making the state societies component parts of the National Dental Association, it became necessary for several state and local societies to change their constitutions and by-laws to conform to the plan of the National Dental Association. In fact the constitution and by-laws of the National Dental Association were revised in order to enable men to become members of component societies. Prior to that time it had been possible for individuals to hold membership in the National Dental Association without being members of the state societies.

When this reorganization took place, independent membership in the National Dental Association became impossible and at the present time no one

can be a member in the National Dental Association who is not affiliated with the state society. It also followed that most state societies were divided up into component societies or districts and now it is necessary for a man to become a member of his local or district society before he can become a member of his state society.

As a result of this plan, at the present time, the only possible way for an individual to obtain a membership in the National Dental Association is through the state society, and the only way he can obtain membership in the state society is through his local society. This resolves itself into a plan whereby it is impossible for any one to become a member of the National Dental Association unless he is a member of the local society representing the state society in the community in which he practices. Therefore it is very important for the National Dental Association that there be a similar qualification for membership in all local and state societies that are component parts of the National Dental Association.

Up to the present time there has been little conflict in regard to the by-laws of different local and state societies in reference to membership, because it has been generally agreed among men in the National Dental Association that the qualification for membership in a local dental society should be; namely, that a man is a legal practitioner, conducting his practice along professional and ethical lines and in accordance with the code of ethics of the National Dental Association.

If the National Dental Association is to render services to the dental profession, from a scientific standpoint and professional advancement, it necessarily must have as large a membership as is possible. In order for this to be accomplished local societies all over the United States should have uniform qualifications for membership in order that all men will have equal privileges in the National Dental Association.

It has been brought to our attention that the First District Dental Society of New York has adopted a set of by-laws which seems to be at variance with the purpose of the National Dental Association and which will defeat the very purpose of the organization of the National, when we remember that membership in the parent body is possible only by membership in the local and state society. Some local societies may believe that they have a right to establish any qualification for membership they so desire and at first thought they may seem to be correct. However, such a plan as that is only a type of the doctrine of "state rights" which has always been more or less of a contention with the various states, when they desired to do something that conflicted with the Constitution of the United States.

At the present time the National Dental Association with its charter and by-laws, is very similar to the Federal Government. The state societies and component societies have the right to make their constitutions and by-laws, but these rules which the local and state societies make should in no way conflict with the National Dental Association. The local societies of any com-

munity should not make restrictions in regard to membership which would be detrimental to the parent body.

The First District Dental Society has created a so-called "junior" membership. It is not really a membership because "junior" members have no right in the state or National Dental Association. The "junior" membership is composed of recent graduates of dental colleges who are legally qualified to practice dentistry but must remain "junior" members for a period of three years. They pay no dues and have only the privilege of attending meetings of the First District Dental Society. This is an unjust discrimination against the recent graduate, and is contrary to the purposes of the National Dental Association according to its present plan of operation.

We find that in order to become an active member in the First District Dental Society, a man must have been engaged in the ethical practice of dentistry for a period of five years. The by-laws do not specifically state that he must have practiced these five years in the First District, but the Chairman of the Committee that proposed the present by-laws stated from the floor that it was the intention of the by-laws to mean that a man locating in the First District must have practiced five years in the First District before he can become a member.

This qualification for membership is extremely unfair to the older practitioners because a man might be engaged in the practice of dentistry in New York State or some other district for eight or nine years or longer and locate in the First District. He could not become a member of the First District Society until he had practiced in that district five years. Of course, according to the present by-laws of the New York State Dental Society he would not be forced to give up his membership in the other district from which he removed and therefore could still retain his membership in the National Dental Association, even if he was not a member of the First District Dental Society.

However, we find this qualification for active membership as required by the by-laws of the First District Dental Society extremely unfair to men who have been engaged in the ethical practice of dentistry in another state than New York, and decide to locate in the First District of New York.

Article III, Chapter 1 of the by-laws of the National Dental Association specifically states that a man can only be a member of the National Dental Association by having a membership in the state society in which he practices. The present arrangement of the by-laws of the First District Dental Society would therefore require a man who had been a member of the National Dental Association for a number of years and who located in the First District of New York, to give up his membership in the National Dental Association for a period of five years before he could again become a member. Because of this conflict in the by-laws of the National Dental Association and the First District Dental Society, one or the other must be changed out of justice to the older practitioner.

We believe the by-laws of the First District Dental Society or any other

dental society should be made to conform with all local and state societies and component societies of the National Dental Association. If the First District Dental Society was not a component part of the state society and if a man residing in the First District could obtain membership in the National Dental Association without becoming a member of the First District Dental Society then we would be willing for the First District Dental Society to have any restriction to membership they so desired.

If any local society that is a component part of the National Dental Association desires to have a membership requirement which is in conflict with other local and state societies and detrimental to the best interest of the National Dental Association, they should give up their representation of the National Dental Association and allow some other local society to become the representative of the National Dental Association in that district.

In the First District of New York there are other dental societies and one particular society has a much larger membership at the present time than the First District Society has. Some of the members of this local dental society, which is not a component part of the National Dental Association are also members of the First District Dental Society and thereby have representation in the National Dental Association. The other members of this large local dental society who are not members of the First District Dental Society, although engaged in the ethical practice of dentistry, are denied membership in the National Dental Association under the present arrangements. It is very probable that other local societies have similar restrictions in regard to membership which are detrimental to the best interests of the National Dental Association.

For that reason there should be some one with sufficient power to make all component societies of the National Dental Association have similar qualifications for membership regardless of the state in which that component society is located. Unless this is accomplished, the National Dental Association will not be the democratic body many hope it will be, neither will it be able to render the best services to the profession.

ORTHODONTIC NEWS AND NOTES

The editors desire to make this department a permanent feature of the Journal, but in order to do so must have the full support of the orthodontic profession throughout the country. We would deem it a great favor if our subscribers and readers would send in such announcements as might be of interest to the profession.

American Society of Dental Radiographers

The Annual Meeting of the American Society of Dental Radiographers will be held at the Ambassador Hotel, Los Angeles, California, on Wednesday and Thursday, July 19-20. A program of unusual interest is being prepared by the Program Committee.

The following is a partial list of papers which will be presented:

"Some Procedures Found Helpful in Making Dental Radiograms." By Dr. J. A. Blue, Birmingham, Ala.

"The Importance of Radiography in Referred Cases From the Medical Profession." By J. A. Bliss, Sioux City, Ia.

"Encouraging the Use of the X-Ray Machine by the Individual Dentist in His Office." By J. D. McAlpin, San Francisco, Cal.

"Radiography and Diagnosis from the Viewpoint of a Dental General Practitioner." By Stephen A. Palmer, Poughkeepsie.

"A Plea for a Standard Terminology in Dental Radiography." By Leland E. Carter, San Francisco, Cal.

H. C. McKittrick, President, I. O. O. F. Bldg., Indianapolis, Ind. Martin Dewey, Secy.-Treas., 501 Fifth Avenue, New York, N. Y.

National Dental Convention

The Twenty-Sixth Annual Convention of the National Dental Association will be held in Los Angeles, California, July 17 to 21, 1922.

The Ambassador, one of the city's newest and largest hotels, situated in the heart of one of the most beautiful residential districts, will be convention headquarters and practically all sessions can be held in the hotel or on the grounds.

The Local Committee on Arrangements can safely state that this meeting will provide an excellent program, demonstrating that "Dentistry can add ten years to the average of human life." This committee can also safely state that our visitors will be well entertained during their sojourn in Los Angeles.

It is none too early to plan a vacation westward in July, 1922, and to send for hotel reservations.

Watch for further and detailed announcements in all Dental Journals. The Local Committee on Arrangements, C. M. Benbrook, General Chairman, 707 Auditorium Bldg., Los Angeles, California.

Pacific Coast Society of Orthodontists

A cordial invitation is extended to all interested in orthodontia to attend the next Annual Meeting of the Pacific Coast Society of Orthodontists, which will be held in Los Angeles, California, July 13, 14, 15, 1922. Those who contemplate being in attendance are requested to make known their intention to the Secretary as soon as possible. Charles G. Mann, President, Seattle, Washington. Carl O. Engstrom, Secy.-Treas., Box 1070, Sacramento, Calif.

Edward H. Angle Society of Orthodontists

The regular meetings of the Edward H. Angle Society of Orthodontists are held at the Hotel Vista del Arrayo, Pasadena, California, on the afternoon and evening of the first Monday of each month.

The regular annual meeting of the Society will be held at the same place on Monday and Tuesday, June 5 and 6, 1922.

Notes of Interest

Dr. George E. Halley announces the removal of his office to 607 Bryant Building, Kansas City, Mo., where he will continue to practice orthodontia exclusively.

Dr. Frank W. Rounds, Clinical Associate of Dr. George B. Winter, of St. Louis, announces the opening of offices in the Professional Building, 270 Commonwealth Avenue, Boston, Mass., for the practice of exodontia and radiodontia exclusively.

Dr. J. F. McDonald announces the removal of his office to 703-4 First National Bank Building, Birmingham, Ala. Practice limited to orthodontia.

Dr. Frederic T. Murlless, Jr., announces that he has removed his office to 43 Farmington Avenue, Hartford, Conn.